Electronic supply chain practice within SMEs manufacturer in the UK.

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Electronic Supply Chain Practice within SMEs Manufacturer in the UK

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Abstract

The concepts of E-Business and Supply Chain Management (SCM) have been broadly investigated in the last 10 years. However, there have been limited insights into the integration of the two concepts - Electronic Supply Chain Management (ESCM). Also, there is limited information about the implementation of E-Business practices in the supply chain management of Small and Medium Enterprises (SMEs). Adopting an exploratory approach, this thesis investigated Information and Communication Technology (ICT) and E-Business as practical and innovative approaches towards supply chain management. Following Tornatzky and Fleischer's (1990) 'Technology-Organisation-Environment' (TOE) theory, which has recently been used by Ifinedo (2011) in investigation of E-business in organisations, this research has attempted to provide a comprehensive view towards the adoption of ESCM. Having explored and extracted key factors influencing the adoption and implementation of ESCM from a literature review, a comprehensive ESCM model was developed. The model is focused towards understanding of the significance of various technological, organisational, environmental and strategic factors on successful adoption of E-Business technologies in supply chain management. Additionally, the advantages of the application of Information Technologies (IT) in supply chain management of SMEs, and possible obstacles are investigated in depth. Using a deductive approach, a questionnaire was designed to explore the research objectives. Consequently, 6 hypotheses were proposed and tested using data from 67 manufacturing SMEs in the UK. The findings of this study will enable comprehensive understanding of the concept of ESCM in SMEs, through exploring the integration of E-Business and supply chain management, and through an investigation of key elements of ESCM adoption. It is hoped that the developed model offers a better and stronger understanding of implementation of IT in SMEs, allowing managers of SMEs to evaluate the level of success and appropriateness of E-Business capabilities and IT strategies in their supply chains.

Key words: Supply Chain Management (SCM), E-Business, E-Business capabilities, Electronic Supply Chain Management (ESCM), SMEs, Information and Communication Technology (ICT)

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Declaration

I certify that, except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously in support of any application for another degree or qualification of this or any other university. The content of this research is the result of work which has been carried out since the official commencement date of the approved research program.

Abbreviations

ATP	Available To Promise
B2B	Business-to-Business
B2C	Business-to-Consumer
BIS	Business Innovation and Skills
BTO	Built-to-Order
C2C	Consumer-to-Consumer
CI	Confidence Interval
CPFR	Collaborative Planning, Forecasting and Replenishment
CRM	Customer Relationship Management
DTI	Department of Trade and Industry
DV	Dependant Variable
EDI	Electronic Data Interchange
ERP	Enterprise Resource Planning
E-SC	Electronic Supply Chain
ESCM	Electronic Supply Chain Management
E-SCN	Electronic Supply Chain Networks
ICT	Information and Communication Technology
IEBT	Information and E-Business Technologies
IOR	Inter Organisational Relationship
IOS	Inter Organisational System
IS	Information Systems
IT	Information Technology
JIT	Just-in-Time
IV	Independent variable
MLL	Model Log-Likelihood
PIT	Publishing, Interacting, Transforming
RBV	Resource Based View
R&D	Research and Development
SCM	Supply Chain Management
SMEs	Small and Medium Enterprises
TLL	Total Log-Likelihood
TOE	Technology, Organization and Environment
VRIN	Valuable, Rare, Imitable and Non-substitutable

Table of Contents

Abstract....ii
Acknowledgement....iii
Declaration....iv
Abbreviations....v
List of Figures....xii
List of Tables....xiii
Chapter 1. Introduction 1
1.1. Introduction 2
1.2. Research background - E-Business and supply chain management in SMEs 3
1.3. Rationale for the research 6
1.4. Research problem definition and questions 9
1.5. Research aim and objectives 9
1.6. Research method 10
1.7. Thesis outline 11
Chapter 2. Literature Review 13
2.1. Introduction 14
2.2. Supply Chain Management (SCM).... 14
2.3. Supply chain management objectives and benefits 16
2.4. Evolution toward integrated supply chain management 17
2.5. Information Technology (IT) and SCM 20
2.5.1. Impact of environmental uncertainty on information collaboration.... 22
2.5.2. IT analytic capability 23
2.6. Electronic business 24
2.6.1. E-Business in the context of SCM (Electronic supply chain management - ESCM) 27
2.6.2. Potential benefits of E-Business in supply chain management 29
2.6.3. E-Business capabilities in SCM 34
2.6.4. E-Business and competitive advantage in SCM 35
2.6.4.1. E-Business strategy in SCM 37
2.6.5. Theories of E-Business adoption in supply chain.... 39
2.6.5.1. Rogers's Diffusion of Innovation Theory 39
2.6.5.2. TOE model 40
2.6.6. Critical success factors and major issues in ESCM 41
2.7. Inter organisational networks 42

2.7.1. Inter Organisational Relationships (IOR) 44
2.7.1.1. Communication 44
2.7.1.2. Collaboration 45
2.7.1.3. Information sharing 45
2.7.1.4. Trust 45
2.7.1.5. Trading partners' power 45
2.8. Co-creating E-Business value in supply chain and performance improvements 46
2.9. Role of Internet in Supply Change Management 48
2.9.1. Benefits of integration of the internet and supply chain 51
2.9.2. The internet and E-supply chain strategy 52
2.9.3. Impact of internet on supply chain processes 54
2.9.3.1. CRM and the customer service management process 55
2.9.3.2. Fulfilment 56
2.9.3.3. Demand management process 57
2.9.3.4. The manufacturing flow management process 58
2.9.3.5. The product development and commercialisation process 58
2.9.3.6. The E-procurement process 59
2.9.3.7. The reverse logistics and returns process 60
2.10. ESCM in SMEs 60
2.10.1. Organisational context 66
2.10.2. Environmental context 69
2.10.3. Technological context (Integration level of the IS/IT capabilities in the strategy) 71
2.11. Critical success factors for E-supply chain adoption in SMEs 73
2.12. Barriers of adoption ESCM in SMEs 75
2.13. Research proposition 77
2.14. Conclusion 78
Chapter 3. Methodology 82
3.1. Introduction 83
3.2. Research philosophy 84
3.2.1. Philosophical Considerations 84
3.2.1.1. Ontological considerations 84
3.2.1.2. Epistemological considerations 85
3.3. Relationship of ontology and epistemology to business research (the paradigm debate) 86
3.4. Philosophical approaches 87

3.4.1. Positivism ... 87
3.4.2. Phenomenology ... 88
3.4.2.1. Philosophical position of neo-empiricism (qualitative positivism) ... 90
3.4.2.2. Philosophical position of critical theory ... 90
3.4.2.3. Philosophical position of affirmative postmodernism ... 90
3.5. Research strategy (Inductive and deductive) ... 90
3.5.1. Deductive research ... 91
3.5.2. Inductive research ... 93
3.5.3. The mixed (balanced) approach ... 95
3.6. Research methods and methodologies ... 95
3.6.1. Interview ... 96
3.6.2. Direct and participant observation ... 97
3.6.3. Questionnaire survey ... 98
3.6.4. Field Simulation/Experiment ... 99
3.6.5. Quasi-experiments ... 100
3.6.6. Case Study ... 101
3.7. Methodological approach in this research ... 101
Chapter 4. Data Collection ... 103
4.1. Introduction ... 104
4.2. Survey research design ... 104
4.2.1. Designing a measuring instrument /Questionnaire ... 104
4.2.2. Operationalising research questions ... 105
4.2.3. Attitude measurement and Likert scale ... 107
4.2.4. Pilot Testing ... 108
4.3. Reliability and validity ... 109
4.3.1. Validity ... 109
4.3.2. Reliability ... 111
4.4. Sampling ... 112
4.4.1. Probability and non-probability sampling ... 113
4.4.2. Sampling variation and confidence interval ... 114
4.5. Data collection process and limitations in this research ... 115
4.6. Conclusion ... 116
Chapter 5. Data Analysis ... 118
5.1. Data preparation and presentation ... 119
5.2. Data analysis ... 119
5.2.1. Univariate and bivariate analyses and test of statistical significance .. 120

5.3. Data analysis part 1: Data analysis for investigating the impact of electronic supply chain practice on integration of supply chain processes . 121
5.3.1. Univariate analysis (Frequency Tables) ... 122
5.3.2. Bivariate analysis and Hypothesis testing ... 126
5.3.3. Logistic Regression ... 135
5.3.4. Logistic Regression outputs ... 136
5.4. Data Analysis part 2: Data Analysis for discovering barriers of successful adoption of E-Business technologies ... 139
5.4.1. Univariate analysis of DV ... 139
5.4.2. Univariate analysis of IVs ... 140
5.4.3. Bivariate analysis after recoding ... 142
5.4.4. Logistic Regression ... 146
5.5. Data analysis part 3: Data Analysis for discovering benefits of successful adoption of E-Business technologies ... 149
5.5.1. Univariate analysis of benefits of successful adoption of E-Business technologies (Frequency Tables) ... 149
5.5.2. Univariate analysis after recoding ... 149
5.5.3. Bivariate analysis after recoding ... 151
5.5.4. Univariate and bivariate analysis after final recording ... 152
5.5.5. Logistic Regression ... 155
5.6. Data analysis part 4: Data analysis for identifying environmental factors influencing successful adoption of E-Business technologies ... 157
5.6.1. Univariate analysis ... 158
5.6.2. Univariate analysis after recoding ... 158
5.6.3. Bivariate analysis after recoding ... 160
5.6.4. Logistic Regression For environmental variables ... 163
5.7. Data analysis part 5: Data analysis for identifying organisational factors influencing successful adoption of E-Business technologies ... 166
5.7.1. Univariate analysis ... 166
5.7.2. Univariate analysis after recoding ... 167
5.7.3. Bivariate analysis after recoding ... 168
5.7.4. Univariate analysis and bivariate analysis after final recoding ... 168
5.7.5. Logistic Regression ... 172
Chapter 6. Conclusion ... 185
6.1. Introduction ... 186
6.2. Research outcomes ... 188
6.3. Discussion of findings ... 188

6.3.1. Hypotheses 1 and 2 188
6.3.2. Hypothesis 3 190
6.3.3. Hypothesis 4 191
6.3.4. Hypothesis 5 192
6.3.5. Hypothesis 6 193
6.4. Research contribution 194
6.5. Recommendation 196
6.5.1. Organisational recommendations 196
6.5.2. Managerial recommendations 197
6.5.3. Theoretical recommendations 199
6.6. Limitation and further research direction 199
6.7. Conclusion 201
Appendix 203
Appendix A.5. Univariate analyses of impact of E-Business on different supply chain business processes 204
Appendix B.5. Univariate analyses of the impact of E-Business on various supply chain processes after recoding 208
Appendix C.5. Bivariate analysis of the impact of E-Business on various supply chain processes after recoding 211
Appendix D.5. Univariate analysis of barriers of electronic supply chain adoption, after recoding 220
Appendix E.5. Bivariate analysis of barriers of electronic supply chain adoption, after first recoding 223
Appendix F.5. Bivariate analysis of barriers of electronic supply chain adoption, after second recoding 237
Appendix G.5. Univariate analysis of the benefits of E-Business 250
Appendix H.5. Univariate analysis of benefits of E-Business after recoding 255
Appendix I.5. Bivariate analysis of benefits of E-Business after recoding 258
Appendix J.5. Univariate analysis of benefits of E-Business after second recoding 269
Appendix K.5. Bivariate analysis of benefits of E-Business after second recoding 272
Appendix L.5. Univariate analysis of the impact of environmental factors on E-Business adoption 283
Appendix M.5. Univariate analysis of the impact of various environmental factors on E-Business adoption after recoding 286

Appendix N.5. Univariate analysis of the impact of various environmental factors on E-Business adoption after recoding 288
Appendix O.5. Univariate analysis of the impact of various environmental factors on E-Business adoption after second recoding 295
Appendix P.5. Bivariate analysis of the impact of various environmental factors on E-Business adoption after second recoding 297
Appendix Q.5. Univariate analysis of the impact of organisational factors on E-Business adoption 304
Appendix R.5. Univariate analysis of impact of various organisational factors on E-Business adoption after recoding 307
Appendix S.5. Bivariate analysis of impact of various organisational factors on E-Business adoption after recoding 309
Appendix T.5. Univariate analysis of impact of various organisational factors on E-Business adoption after second recoding 318
Appendix U.5. Bivariate analysis of impact of various organisational factors on E-Business adoption after second recoding 320
Appendix V. Cover letter for questionnaire 329
Appendix W. Questionnaire 330
References 332
Bibliography 363

List of Figures

Figure 2.1. Levels of SCM based on stages of enterprise 16
Figure 2.2. A structure of supply chain 19
Figure 2.3. Main E-Business drivers 25
Figure 2.4. Framework of an E-supply chain 29
Figure 2.5. E-Business in the supply chain – five phases of evolution 33
Figure 2.6. TOE model 40
Figure 2.7. E-supply chain technology implementation 44
Figure 2.8. Implications of the internet in strategy 53
Figure 2.9. A framework for ESCM 54
Figure 2.10. The PITs model of ICT adoption by SMEs 63
Figure 2.11. The DTI adoption ladder 64
Figure 2.12. Research proposed model on the ESCM in SMEs 66
Figure 3.1. Process of deductive logic 92
Figure 3.2. The inductive development of theory 93
Figure 3.3. Research process 96
Figure 5.1. Impact of E-Business on supply chain management 175
Figure 5.2. Barriers in relation to successful adoption of E-Business technologies in supply chain 177
Figure 5.3. Benefits in relation to successful adoption of E-Business technologies in supply chain 179
Figure 5.4. Proposed ESCM framework 181
Figure 5.5. Proposed ESCM framework for manufacturing SMEs in the UK .. 182

List of Tables

Table 2.1. The potential advantages of adoption and implementation of E-Business ... 32
Table 3.1. Four paradigms towards management research ... 86
Table 3.2. Philosophical extremes ... 87
Table 3.3. Comparison of weaknesses and strengths of philosophical approaches ... 89
Table 3.4. Features of qualitative and quantitative research ... 94
Table 4.1. Technological, Organisational and Environmental factors influencing the adoption of electronic supply chain management ... 106
Table 4.2. Main E-Business drivers ... 107
Table 4.3. Factors influenced by adoption of ESCM ... 107
Table 5.1. Helpfulness of E-Business on supply chain integration ... 122
Table 5.2. Impact of E-Business on supply chain management ... 122
Table 5.3. Helpfulness of E-Business on supply chain integration ... 124
Table 5.4. Impact of E-Business on supply chain management ... 124
Table 5.5. The summary of the second round of recoded univariate analysis 125
Table 5.6. Impact of E-Business on Supply Chain Management * helpfulness of E-Business on supply chain integration ... 127
Table 5.7. Chi-Square Tests ... 127
Table 5.8. Symmetric measures ... 128
Table 5.9: Bivariate analysis of impact of E-Business on "various supply chain processes" and "supply chain integration" including Cross-tabulation and chi-square tests ... 129
Table 5.10. Helpfulness of E-Business on value chain integration ... 136
Table 5.11. Case processing summary ... 136
Table 5.12. Dependent variable encoding ... 136
Table 5.13. Categorical variables coding ... 137
Table 5.14. Iteration history[a,b,c] ... 138
Table 5.15.Omnibus tests of model coefficients ... 138
Table 5.34. Summary of Univariate analysis of the "impact of environmental factors" after recoding ... 159
Table 6.1. Hypotheses ... 187

Chapter 1. **Introduction**

1.1. Introduction

This research, through adopting an exploratory approach, attempts to critically investigate the electronic supply chain practice and adoption of E-Business technologies among manufacturing SMEs within the UK. The main focus of this research is on investigating factors influencing successful supply chain practise within Yorkshire manufacturing SMEs. Given the fast obsolescence of technological products and in order to make sure that the selected companies will be applying information technology in their business processes, the manufacturing SMEs selected for this research are mainly involved with production of technological products (products that require use of a certain kind of technology).

To discover the role of E-Business in Supply Chain Management (SCM), concepts such as supply chain integration, E-Business capabilities in supply chain management, competitive advantage resulting from electronic supply chain practice, and alignment of Information Technology (IT) strategy with overall business strategy are discovered. Moreover, this research looks into the critical success factors for adoption of E-Business technologies as well as barrier of IT implementation. Also, factors such as Inter Organisational Relationships (IOR) and networks, performance improvements resulting from co-created E-Business value in supply chain, and the impact of environmental uncertainty on information collaboration as well as IT analytic capability are discussed in depth. Last but not least, having analysed the evolution of E-supply chain and several theories of E-Business adoption in supply chain, a comprehensive framework for electronic supply chain practice, based on Technology, Organisation and Environment (TOE) theory (Tornatzky and Fleischer, 1990), is proposed. Subsequently, this model is discussed, particularly in the area of SMEs, and is analysed through conducting a survey of manufacturing SMEs in the UK. The main aim of this research is to discover the key factors influencing the adoption of E-Business technologies in SMEs. The key outcome of this research is the proposition of an ESCM model, which can be valuable in the analysis of electronic supply chain adoption in SMEs. The following sections will explain the research background and the rationale for the research. Furthermore, the research scope and objectives, research methodology and methods used will be discussed. Finally, the structure of the thesis will be presented and a summary of this chapter will be provided.

1.2. Research background - E-Business and supply chain management in SMEs

The approach of conducting business has been continuously changing from face-to-face human interactions towards the virtual business environment, resulting in the emergence of E-Business. E-Business refers to automated business processes conducted by means of information and communication networks and technologies. E-Business technologies enable integration of supply chain processes and result in 'end to end' business operations. End-to-end business operations imply smooth, interactive and collaborative connections between different parties in a supply chain which include designers, suppliers, buyers, trading partners, logistics providers and end-customers (Papazoglou and Ribbers, 2006).

It is argued that E-Business applications and web-based information technologies have basically changed the way companies conduct their business and the way in which they compete with each other (Sanders, 2007). In other words, information technologies have transformed business operations and processes as well as creating completely new business models and markets (Jin, 2006). Evans and Wurster (2000) argue that increased use of the internet as a communication channel has changed the information economy, creating new opportunities and new forms of association and transaction between organisations.

Internet and information technologies enable efficient inter-organisational information flows and facilitate SCM (Chong et al., 2009). Developments in information systems and information technologies allow the 'virtual integration' of the entire supply chain, assisting the coordination between different parties in the supply chain. The focus of this integration in the context of web-based activities is referred to as Electronic Supply Chain Management-ESCM (Giménez and Lourenco, 2008). Bowersox et al. (cited in Iyer, 2011) define supply chain management as cooperative-based strategy which creates association between various inter-organisational business processes, and leads to the creation of shared market opportunities. SCM is considered as a key strategic challenge for companies. In other words, the strategic and competitive success of an organisation depends on the efficient management of the skills, resources and capabilities of its suppliers, distributors and business processes. Supply chain management is regarded as a critical element of successful E-Business implementation (Croom, 2005). Dynamism in supply chains necessitates regular flows of information and products between different parties in the supply chain, which in turn requires flexibility, agility and effective interactions in the supply chain (Chopra and Meindl, 2012).

According to Hwang and Lu (2013), electronic supply chain management comprises strategic and systematic synchronisation of the main inter-organisational supply chain processes. They argue that successful adoption of E-Business in supply chain management requires organisations to re-structure and re-organise their existing business processes in order to ensure long-term performance improvements and accomplishment of E-Business goals. Closer enterprise collaborations and efficient information flows are some of the benefits of implementation of electronic supply chain practices (Su et al., 2008; Kayakutlu and Büyüközkan, 2010). Interactive and collaborative connections bring about better realisation of requirements of various parties in the supply chain and result in the development of effective customer and supplier relationships (Sepehri, 2012). Furthermore, internet technologies provide the system and support for successful implementation of business strategies and lead to performance improvements (Raymond and Bergeron, 2008). Similarly, Cagliano et al. (2005) argue that information systems, through enhanced process efficiency and integration, provide powerful tools that allow organisations to improve supply chain performance significantly.

Information and communication technologies can improve SCM decision making by providing real-time information and enabling cooperation between different partners in the supply chain. Improved customer relationship management and customer service, in terms of enhanced communication and increased speed and efficiency, are the main benefits of adoption of E-Business technologies in a supply chain (Wagner et al., 2003). Similarly, Devaraj et al. (2007), argue that E-Business results in potential benefits for supply chains, mainly by resulting in enhanced customer service, faster transaction times and reduced production cycles.

Considering the importance of E-Business technologies in supply chain management, investigation of successful adoption and implementation of information and communication technologies is of huge significance for companies. Therefore, analysis of critical success factors and elements influencing the acceptance of information technologies is undeniably essential (Feindt et al., 2002; Benjamin and Blunt, 1992).

Rogers' (2003) theory of 'Diffusion of Innovation' and Tornatzky and Fleischer's (1990) 'Technology-Organisation-Environment (TOE)' theory have considered the adoption of E-Business to an existing business structure as adoption of a new innovation (Ngai and Gunasekaran, 2004; To and Ngai, 2006). Based on the theory of diffusion, companies need to consider factors such as relative advantage, compatibility, complexity, triability and observability when considering adoption of new technologies (Chong et al., 2009). On the other hand, TOE theory investigates mainly technological, organisational and environmental factors which might have impact on adoption of E-Business.

This research, following a comprehensive view of the concept of electronic supply chain practice, attempts to conduct a broad investigation of various factors influencing the adoption of E-Business (factors discussed in previous literature). The aim is to propose a comprehensive framework for analysis of E-Business adoption in supply chain management. Moreover, other main issues around electronic supply chain management, which have gained more focus recently, such as networked information systems and inter-organisational relationship (Bachmann and Inkpen, 2011), performance improvements resulting from co-creating E-Business value in supply chains (Wang et al., 2013), alignment of IT strategy and corporate strategy (Schoemaker, 2012), as well as the impact of environmental uncertainty on information collaboration and IT analytic capability (Iyer, 2011) have been explored in depth in this research.

1.3. Rationale for the research

Over the past decade, a combination of economic, technological and market forces (such as globalisation, product variety), and increasing complexity in supply networks have forced companies to examine and reconstruct their supply chain strategies (Lee and Whang, 2001). Global sourcing and emphasis on time and quality-based competition as well as environmental and market uncertainty are believed to be the main factors influencing SCM. The globalisation of supply and international competition along with the above mentioned factors have compelled companies to look for more effective ways to coordinate the flow of materials within their supply chain, and move towards integrated and incorporated supply chains (Mentzer et al., 2001).

It is argued that in the new economy competition is based on supply chain networks rather than organisations (Ketchen and Hult, 2007). Effective supply chain management and supply chain integration is considered to be a significant source of providing sustainable competitive advantage as well as having a key strategic role in the success of companies (Li et al., 2006). Electronic networks can create competitive edge by removing communication boundaries between the parties in a supply chain and result in the integration of a supply chain. Moreover, information systems, through enabling forecasting and planning, bring about reduced costs and improved responsiveness (Moodley, 2001). Given the impact of effective supply- chain management, ensuring integration of supply chains and smooth communication within a supply chain are essential for the successful conduct of business processes. The need for integrated supply chains and interactive connections between various parties in the supply chain necessitates the adoption and implementation of information and communication technologies (Papazoglou and Ribbers, 2006).

Boyer and Hult (2005) and Liu et al. (2010) consider electronic supply chain management as a critical component of a company's supply chain strategy. It is argued that the level of alignment of IT strategy selected in supply chain management and overall business strategy is of huge significance. High configuration and association of E-Business capabilities with overall corporate strategy leads to enhanced organisational performance of SMEs by influencing growth, productivity and profitability (Luftman et al., 2006; Raymond and Bergeron, 2008).

The economic development of countries is largely dependent on SMEs (Ifinedo, 2011; Haug et al., 2011). Based on the research of the UK department for Business, Innovation and Skills (BIS), focusing on 'Business Population Estimates for the UK and Regions 2013', the total number of private sector businesses in the UK at the start of 2013 was 4.9 million, of which 99.9 percent were SMEs, accounting for 48 percent of private sector turnover in the UK (estimated combined annual turnover of £1,600 billion) and employing an estimated 14.4 million people (59.3 percent of private sector employment) (Department for Business, Innovation and Skills, 2013).

Given the importance of SMEs in terms of the domination of the overall UK base company and their impact on employment and turnover generation, their survival and successful operation is very important. In order for SMEs to improve their performance and gain competitive advantage in the digital and global economy, it is necessary for them to use E-Business technologies in their supply chain processes.

Ritchie and Brindley (2005) argue that SMEs have the advantage of flexibility (in terms of their structure), and their flat managerial structure enables them to easily approach decision making in the area of IT and have smooth planning structures in place, as well as being more adaptive compared to large organisations. However, lack of financial resources (Scupola, 2003; Love et al., 2001), lack of computer literacy and technical skills (Maguire et al., 2007), as well as having a rigid production plan (Lee et al., 2005; Forsman, 2008; Andersson and Tell, 2009) makes it difficult for SMEs to get involved in the adoption of E-Business technologies. Similarly, according to Çalipinar (2007), ineffective change management and lack of cooperation in a supply chain are believed to influence the implementation of E-Business. Some of the important factors having an impact on successful acceptance and implementation of E-Business technologies are summarised below:

- Lack of awareness of IT readiness (Haug et al., 2011);
- Lack of knowledge regarding IT (Simpson and Doherty, 2004);

- Lack of internal expertise and skilled employees (Huin, 2004);
- Lack of knowledge and required skills (Attewell,1992);
- Lack of external technical support (Scupola, 2003; Simpson and Doherty, 2004).

Alam and Ahsan (2007) argue that despite the fact that many SMEs are aware of the general benefits of E-Business adoption and acknowledge the significant impact of E-Business technologies on improving business processes, developing electronic markets and enabling electronic data exchange (Whiteley, 2000), they are still hesitant to implement information and communication technologies in the conduction of their business activities. According to Wagner et al. (2003), one of the reasons behind the reluctance of SMEs to adopt IT is a lack of adequate evidence on real performance benefits in early stages of adoption. Moreover, some SMEs are unaware of the potential and impact of information technologies on improvement of their business processes (Dixon et al., 2002; Buckley and Montes, 2002; Acar et al., 2005). Given the barriers faced by SMEs and the significant impact of E-Business technologies on enhancement of supply chain management, SMEs need to analyse the factors influencing adoption of electronic supply chain management and identify their IT readiness. Therefore, adoption of any new technology into business framework of SMEs involves consideration of various issues including the environmental, organisational and technological issues.

Given the significant role of SMEs in the economy (SMEs account for 48.1% of turnover in the UK private sector) (Department for Business, Innovation and Skills, 2013) and the important impact of E-Business technologies on the improvement of customer relationship management and supply chain management, it is absolutely necessary for companies to evaluate their readiness for IT adoption as well as analysing critical success factors for the implementation and adoption of information technologies. This research, through the exploration of some theories including Technology, Organisation and Environment (TOE) theory (Tornatzky and Fleischer, 1990), has attempted to gain a better understanding of factors influencing the adoption of E-Business in companies. So, having investigated relevant theories in the area of E-Business adoption and having examined recent literature, a comprehensive electronic supply chain management (ESCM) framework has been proposed. The aim of the proposed framework is to increase the awareness of SMEs in the area of electronic supply chain management. It will, also, assist SMEs in terms of examining their IT capabilities and identifying their readiness for acceptance and adoption of ESCM, as well as removing some of the ambiguity surrounding the impact of the adoption of E-Business technologies.

1.4. Research problem definition and questions

According to recent studies, many SMEs fail to realise the potential of ICT in the improvement of their supply chain processes and are unable to recognise and identify the critical success factors for adoption of information and communication technologies in their supply chain (Haug et al., 2011). Moreover, there is limited insight into how SMEs can benefit from the implementation of IT and improve their performance. Consequently, the employment of E-SC practice does not often lead to significant advantages. So the main question in this research is:

How can SMEs successfully adopt and implement electronic business in their supply chain management?

1.5. Research aim and objectives

This research aims to investigate electronic supply chain practice amongst manufacturing SMEs within the UK. It attempts to identify the main factors influencing the adoption and implementation of E-Business technologies in the supply chains of companies.

The primary objective is to conduct an in-depth and critical review of previous literature to explore key issues regarding integration of E-Business and supply chain management, as well as discovering key factors influencing the adoption of IT. The second objective is to investigate the impact of the implementation of E-Business technologies on the enhancement of integration in supply chains and the improvement of supply chain management. Thirdly, the intention is to look into critical success factors and barriers to E-Business adoption, and to investigate how SMEs can successfully adopt and implement E-Business technologies in their supply chain. Finally, having analysed various theories and models of IT adoption, the goal is to develop and propose a comprehensive E-SC adoption model for analysis of readiness of E-Business technologies in organisations.

To summarise, the main objectives of this research are:

- To investigate integration of E-Business and supply chain management
- To explore the impact of electronic supply chain practice on the improvement of supply chain management/integration
- To find out any benefits and possible obstacles of the adoption of E-supply chain practice in SMEs
- To investigate various E-supply chain models and propose/develop an ESCM framework for the analysis of IT adoption in manufacturing SMEs.

1.6. Research method

This research follows the philosophical approach of positivism which is based on deductive/quantitative research strategy. Based on this approach, people cannot influence social factors. In other words, social factors are external and objective facts independent of human effect. Therefore, an organisation is considered as a real object with defined regulations. Having reviewed recent academic literature in the area of supply chain management and electronic business, and based on the main objectives of this research, 6 hypotheses were proposed to be tested. So, quantitative methodology of survey research was adopted for conducting the research, which required designing a measurement instrument. After deciding on using questionnaires as a method of data collection, and after operationalising research questions, a pool of items were extracted to be considered in the questionnaire. Finally after designing the questionnaire and pilot testing, the questionnaire surveys were sent to manufacturing SMEs by post. The questionnaire in this research is based on Likert scales, which require formulating a set of statements relating to the research problem, and asking people to state the extent of their agreement or disagreement with each statement, using measurement scales.

1.7. Thesis outline

The structure of this thesis is now discussed in summary.

Chapter 1: Introduction

This chapter provides an overview of the research, including the research background (E-Business and supply chain management in SMEs), the rationale for the research, the research problem definition and research questions, the research proposition, the aim and objectives, methodology, and finally, the thesis structure.

Chapter 2: Literature review

This chapter critically investigates recent academic literature in the area of supply chain management and the role of information and communication technologies such as E-Business on integration of supply chains. Other subjects discussed in this chapter include: E-Business capabilities; competitive advantage; IT analytic capability; theories of E-Business adoption; potential benefits of E-Business adoption; inter organisational networks; critical success factors of E-supply chain adoption and barriers to adoption of ESCM.

Chapter 3: Methodology

This chapter looks into the research philosophy and philosophical approaches of the study as well as its philosophical considerations, including ontological and epistemological issues. Furthermore, the relationship of ontology and epistemology to business research is discussed. Finally, research strategies including inductive and deductive strategies, and research methods and methodologies are analysed.

Chapter 4: Data collection

In this section of the thesis survey research methodology and procedures relating to the development of questionnaires are investigated. Having operationalised research questions based on previous literature, pools of items are selected for inclusion in the questionnaire. Other areas covered in this chapter include attitude measurement and Likert scales, pilot testing, sampling, reliability and validity. Finally, challenges involved with data collection process in this research study are analysed.

Chapter 5: Data analysis

This chapter discusses data preparation and presentation as well as interpretation and data analysis. After univariate and bivariate analyses and tests of statistical significance, the 6 proposed hypotheses are tested. Lastly, logistic regression analysis is carried out to explain the relationship of several independent variables to a binomial (dichotomous) dependent variable (DV).

Chapter 6: Conclusion

In the last chapter of the thesis, research outcomes and findings of the research are discussed. The research contribution is presented alongside organisational, managerial and theoretical recommendations. This is followed by consideration of limitations and opportunities for further research. In the end, a summary of the thesis is provided.

Chapter 2. **Literature Review**

2.1. Introduction

One of the main strategic challenges for organisations is being able to manage their supply chains effectively. In other words, the strategic and competitive success of an organisation depends on the ability to exploit the skills, resources and capabilities of different parties in the supply chain. Supply chain management is considered to be a critical element of successful E-Business implementation (Croom, 2005). Internet and information technologies allow for efficient inter-organisational information flows, facilitating SCM (Chong et al., 2009). The internet can improve SCM decision making by providing real-time information and enabling cooperation between different parties in the supply chain. Improved customer service, in terms of improved communication and increased speed and efficiency, are the main benefits of adoption of E-Business technologies in supply chain (Wagner et al., 2003). Devaraj et al. (2007) argue that E-Business results in potential benefits for supply chains, mainly by enabling enhanced customer service, faster transaction times and reduced product cycles. Since SMEs play a crucial role in the economic development of countries around the world (Ifinedo, 2011), successful adoption and implementation of E-business in their supply chain is of huge significance.

2.2. Supply Chain Management (SCM)

The term SCM came to attention first in the late 1980s and became commonly used in the 1990s. Before that time, the concept of supply chain management was introduced using terms such as 'logistics and operations management'. The speed of change and the uncertainty about market evolution has made it more and more important for companies to analyse carefully the supply chains in which they operate. In other words, those companies that learn how to create and contribute to strong supply chains will have a significant competitive advantage over their competitors (Hugos 2006).

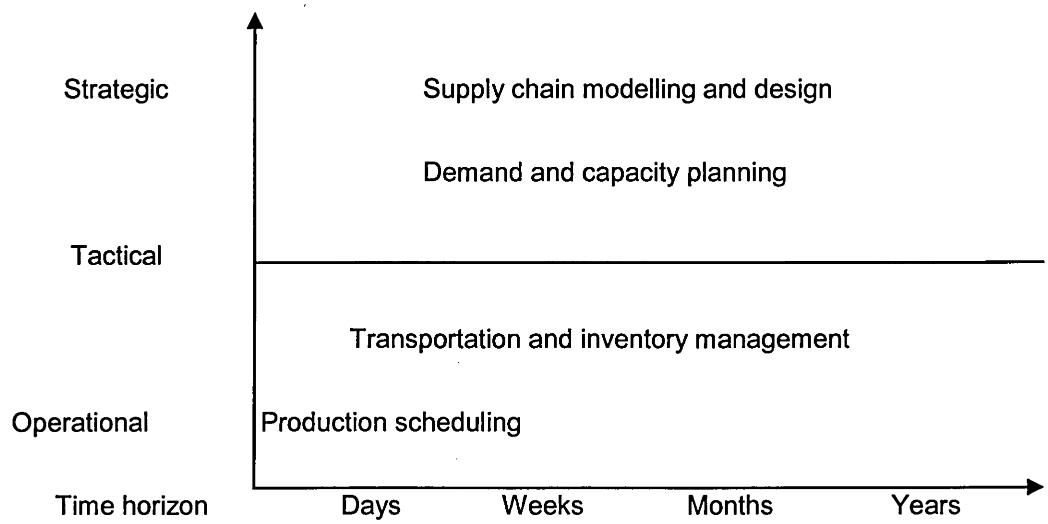
Within each organisation, the supply chain involves all activities concerned with receiving customer requests and meeting their demands as well as developing new products, operations, marketing, distribution, finance, and customer service. Chopra and Meindl (2012) argue that supply chains involve a range of different stakeholders including: customers, retailers; distributors/wholesalers;

manufacturers; and suppliers. The main components of SCM, according to Koh and Maguire (2004), include: planning; sourcing; making; delivering; and returning.

A supply chain is dynamic and requires the regular flow of information and product between different stages in the supply chain (Chopra and Meindl, 2012). So, the integration of the whole supply chain is essential for the successful accomplishment of business operations. According to Bowersox et al. (2002), SCM is considered to be a process of collaboration, which integrates business processes in the supply chain. Supply chain management, also known as 'supply chain integration or optimisation', "*is the process of optimising a company's internal practices in interacting with suppliers and customers in order to bring products to market more efficiently*" (Leon-Pena, 2008, p.59). Similarly, Bowersox et al. (cited in Iyer, 2011) define SCM as a 'collaborative-based strategy' which connects inter-organisational business processes to create a shared market opportunity. Furthermore, Oliver and Webber (cited in Giménez and Lourenco, 2008) consider SCM as the management of 'internal supply chain' that incorporates different business processes involved in the flow of information and materials in order to create value for customers. In another definition by Koch (2002), SCM is defined as "*the combination of art and science*" that improves all business processes involved in manufacturing and delivering value to customers (p.339).

Croom (2005) suggests that in order to deal with the diversity of SCM definitions, companies need to focus on main business processes relating to SCM (e.g. fulfilment, operations planning and procurement). For instance, Tyndall et al. (cited in Mentzer et al., 2001) define SCM in 'operational terms', emphasising movement of products and material and management of business processes. Similarly, Yin and Khoo (2007) argue that SCM has different levels; from operational and short-term levels of management (e.g. production scheduling) to strategic and long-term levels (e.g. supply chain design, modelling and simulation) (Figure 2.1). Leon-Pena (2008) argues that a strong SCM includes the optimisation of operational and strategic information and systems as well as business processes and business value in every stage of enterprise.

Figure **Error! No text of specified style in document.**.1. Levels of SCM based on stages of enterprise



Source: Yin and Khoo (2007)

2.3. Supply chain management objectives and benefits

Lord (2000) considers SCM and customer relationship management (CRM) to be parts of the infrastructure of enterprises, which enable them to build customer confidence. Businesses have become customer-centric and developed into a customer-driven market. Therefore, customers have a significant impact on the strategic direction of companies. Consequently, enhancing the ability of companies to maintain customers and managing the boundaries between the company and its clients are considered as important issues in SCM (Croom, 2001). SCM as a strategic approach for increasing customer satisfaction/value is based on cooperation, integration and improved management of business operations (Stank et al., 2001).

Effective supply chain management results in closer enterprise collaborations (Su et al., 2008; Kayakutlu and Büyüközkan, 2010), and supply chain collaboration, consequently, creates better cooperation and understanding of different partners' activities and improves information exchange (Kandemir et al., 2006). SCM includes business strategies that enable companies to decrease costs, increase revenue and expand market presence by improving the effectiveness of the supply chain (Moodley, 2001). Similarly, Cross (2000) argues that improved revenue growth, decreased operation costs and enhanced customer service are resulted from effective SCM. Large companies that have improved their supply chains benefit from enhanced supply chain processes ranging from 10% to 80%, experience forecast improvements and inventory reduction as well as overall supply chain cost improvements of 10% to 50% (Cross, 2000).

According to McGuffog (1999), SCM aims to enhance the business performance and cost-efficiency of companies by improving speed and certainty, and increasing the net value added by business processes. The ability of firms to respond rapidly to the opportunities and challenges created by suppliers, customers and competitors is one of the main factors behind the success of companies (Moodley, 2001). Moreover, according to the study of Croom (2005), the key supply chain issues for manufacturing sector are "*price and cost pressures, supply chain integration and Knowledge management*" (p.64). He argues that squeezing costs out of supply chains is becoming more and more significant for companies' success, particularly in view of the importance of cost reductions on customer satisfaction.

Effective business operations and improvements in the implementation of business processes are some of the major benefits that result from SCM (Germain and Iyer, 2006). According to Hugos (2006), improved customer service levels and increased efficiency are significant outcomes of having effective SCM.

2.4. Evolution toward integrated supply chain management

Chandra et al. (2002) argue that during the 1990s firms faced some major changes in their business environment and organisational structures, which required them to improve their supply chains by:

- Competing in global markets;
- Increasing their strategic alliances ;
- Aligning their organisational structures with business processes;
- Improving their manufacturing systems through the employment of IT technologies;
- Focusing on total cost for a product rather than selecting lowest price from immediate vendors;

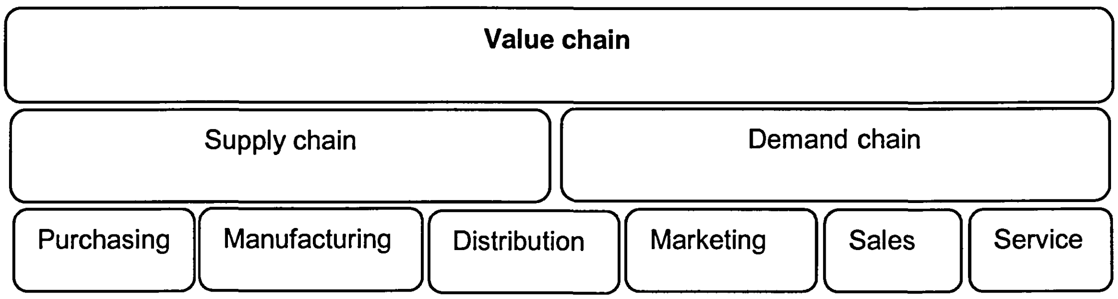
- Depending more on purchased materials and external processing (outsourcing);
- Reducing the number of their suppliers and creating efficient information sharing between their customers and suppliers;
- Changing their focus from mass production to mass customisation;
- Emphasising flexibility and coordination;
- Establishing 'knowledge-based and real-time decision support systems' to allow flexibility and rapid respond to competitive pressure;
- Increasing co-operation among trading partners;
- Re-structuring and managing their organisations.

All of the above mentioned factors require companies to have more integrated supply chains. According to Closs and Savitskie (2003), while upstream supply chain activities are believed to be vital for supply chain coordination, downstream activities such as planning and forecasting have a significant influence on overall performance. Therefore, integrating downstream and upstream supply chain activities is of significant importance for companies. Similarly, Moodley (2001) argues that companies need to integrate their back office operations (e.g. finance; planning and execution; purchasing; research and development; human resources; and inventory management) and front office operations (e.g. sales, marketing, and customer service applications) in order to respond rapidly to changes in customer demand.

Croom (2005) emphasises the importance of customer side (downstream) supply chain activities and suggests that companies need to enhance their customer service through creating closer relationship with customers. He argues that large and global customers play a significant role in "*driving increased co-ordination and the adoption of CRM*" (Croom, 2005, p.60). According to him, even the strategic position of organisations is influenced by their key customers.

Gereffi (1999) contends that supply chain integration is a main source of competitive advantage that requires networked relationships. Supply chain collaboration creates better cooperation and understanding of different partners' activities and improves information exchange. Moreover, it reduces delays and product faults (Kandemir et al., 2006). Enhanced communications and cooperation between upstream and downstream supply chain activities result in improved business operations (Rodrigues et al., 2004). In other words, integration of the value chain (Figure 2.2) is one of the factors behind the success of enterprises, which, in turn, results in creation of competitive advantage for them. As well as creating an efficient relationship with their suppliers, customers and business partners, companies need to be able to adapt rapidly to unpredictable changes in market demand, and to enhance their business activities including product development, sourcing, production and distribution (Moodley, 2001).

Figure **Error! No text of specified style in document.**.2. A structure of supply chain



Source: Moodley (2001)

Demand chain collaboration is concerned with creating effective communications with 'downstream supply chain partners', which leads to the creation of end-customer value. It is concerned with transparency of business processes, efficient information sharing, cooperative decision-making and forecasting in the supply chain. Improved operational performance and enhanced customer demand responsiveness are associated with demand chain collaboration (Iyer, 2011).

Wang and Wei (2007) argue that demand chain collaboration is essential for creating competitive edge for organisations, since it allows companies to integrate operational strategies, coordinate business processes and effectively share information and resources in order to achieve joint goals (Kandemir et al., 2006).

According to Croom (2001), there is a need for strong integration between the 'boundary-spanning' and the 'core' supply chain activities of an organisation. Boundary spanning supply chain activities include: CRM; order fulfilment processes; purchasing; and vendor managed fulfilment. Core supply chain activities, which enable organisations to support their competitive or strategic performance, include: materials management; operations management; design and procurement.

Handfield and Nichols (1999) argue that the main company objectives for supply chain integration are:

- To reduce design, development and procurement cost and time;
- To improve product technology and quality;
- To develop a long term supplier relationship;
- To employ human resources more effectively;
- To improve customer service;
- To reduce technological and financial risk;
- To comply with environmental and governmental regulations.

It is argued that failure of a supply chain happens due to a lack of communication between the parties in a supply chain. This results in inefficiency and increased costs. Integration of internal and supplier systems as well as supplier readiness and capability are considered to be the main challenges for supply chain integration. Information and communication technologies enable the effective interaction of different parties in the supply chain and allow them to easily communicate with those behind and ahead of them in the supply chain (Leon-Pena, 2008).

2.5. Information Technology (IT) and SCM

The use of IT during the last decade has considerably transformed the way in which organisations perform their operations. Information technology is considered to have strategic importance to companies (Haug et al., 2011). Network design and information technology are the main issues of operation and execution in supply chains (Simchi et al., 2004). Web enabled technologies have the potential to coordinate supply chain operations and allow companies to "*achieve new levels of efficiency and productivity*" (Moodley, 2001, p.45). According to Cegielski et al. (2012), manufacturing firms support their quality management through the use of information and communication technologies, and improve their manufacturing and production processes by eliminating waste in the form of product defects. Furthermore, information technologies are used to coordinate and integrate business operations in supply chains and lead to improved performance (Rodrigues et al., 2004; Wang and Wei, 2007). Similarly, Chou et al. (2004) state that internet technologies such as E-Business enable companies to enhance information sharing in their supply chain.

Hollander et al. (2000) contend that the benefits of IT regarding supplier and customer relationship management are enhanced transaction processing, reduced transaction costs and prompt response to customer demands. There is a close statistical connection between the distribution of IT, productivity and competitiveness of organisations (Kwon and Stoneman, 1995).

Subramani (2004) argues that if companies need to enhance their integration and collaboration with different parties in their supply chain, they should ensure application of similar electronic systems and information technologies. In spite of huge investment costs and extensive use of IT, some of information technologies adopted by companies fail to fulfil business expectations regarding time and budget (Doherty et al., 2003; Bruque and Moyano, 2007). According to Bruque and Moyano (2007), the following factors significantly influence the implementation of IT in companies:

- Support of management and technology leaders in technological change;
- Level of technological education of the employees;
- The compatibility of strategy with regard to implementation;
- Integration level of the IS/IT in the business strategy;
- Size of firm.

Similarly, Sarosa and Zowghi (2003) identify factors relevant for IT adoption as the following:

- Attitude, knowledge and support of owner/manager;
- Attitude, knowledge and acceptance of employee;
- Resource availability;
- Suppliers;
- Customers;
- Competitors;

- Government;
- IT product vendors;
- IT consultants.

Chan and Ngai (2007) argue that relative advantages, costs, organisational factors, technological factors, top management support, external pressures, and individual characteristics are the main elements influencing IT adoption in companies. According to them, compatibility of the internet with organisational culture and infrastructure and top management support are the most significant factors affecting internet adoption. Haug et al. (2011) provide a framework for understanding the concept of IT readiness, which allows companies to identify challenging issues regarding the adoption of information technologies and to take necessary actions to resolve them. They classified IT readiness factors under three categories of characteristics of company, management, and employee and six dimensions: pressure to change existing processes; room for risks; IT acquaintance; IT project support; IT skills; and IT project motivation. These dimensions provide a solid basis for evaluating IT-readiness in companies.

2.5.1. Impact of environmental uncertainty on information collaboration

Two critical dimensions of uncertainty on information collaboration are considered to be 'technological turbulence and market turbulence'. Market turbulence refers to the rate of change and dynamism in the market and customer preferences (Slater and Narver, 1994). On the other hand, technological turbulence is concerned with the rate of change in operational process as well as production and service technologies. Rapid changes in fundamental production and service technologies, frequent changes in the main designs and technological standards can create high levels of technological turbulence (Kandemir et al., 2006).

As a result of high levels of market turbulence, companies fail to predict future market trends. Kandemir et al. (2006) argue that high levels of uncertainty influence collaborative operational decisions, which, in turn, affects performance. Increased business process uncertainty and variations in customer delivery schedules and efficiencies lead to poorer customer service levels (Iyer et al 2007). Haug et al. (2011) argue that information technologies can be used to provide new services to customers, and improve the business processes of companies in competitive business environments. Companies operating in competitive market environments need to have better communication with their parties in the supply chain to be able to competitively respond to market demands, as well as maintaining high customer service levels. It is argued that information access, speed and flexibility in planning, and developing market responsiveness capabilities are considered crucial for the competitiveness of companies (Iyer, 2011).

2.5.2. IT analytic capability

'Sophisticated IT applications' that provide information for managers and enhance decision making are referred to as 'IT analytic capability'. It is argued that "*Given the complexity of supply chain processes and the need for accuracy and speed in strategic to detailed operational level decision-making, IT analytic capability is considered a critical IT component facilitating collaboration*" (Iyer, 2011, p.87).

IT analytic capability is a means of communication for coordinating operational processes across value chains, which integrates business activities into one logical enterprise. The need for processing huge amounts of data requires companies to create 'organic organisational structures' that support efficient information exchange and integrative systems (Kim and Mahoney, 2006). 'IT analytic-capability enabled decision-making ability', according to Bowersox et al. (2002), allows a company to enhance their competence to successfully respond to market change and take advantage of appropriate opportunities. Melville et al. (2004) state that IT analytic capabilities enhance collaborative activities between different parties in the supply chain, create collective resources and simplify operations.

Companies can apply IT analytical tools to anticipate changes in customers' demands, and to improve their responsiveness. These tools assist companies at the operational and strategic level to:

- Analyse customer orders;
- Obtain the optimal inventory;

- Design efficient delivery routes;
- Design efficient supply networks (Giménez and Lourenco, 2008).

According to Iyer (2011), IT analytic capability allows for cooperative decision making and enhances supply chain collaboration, leading to sustainable competitive advantage. Advanced IT analytic tools such as 'planning and scheduling or transportation management systems' streamline collaborative activities and reduce coordination costs by facilitating operations and allowing companies to be responsive to market needs.

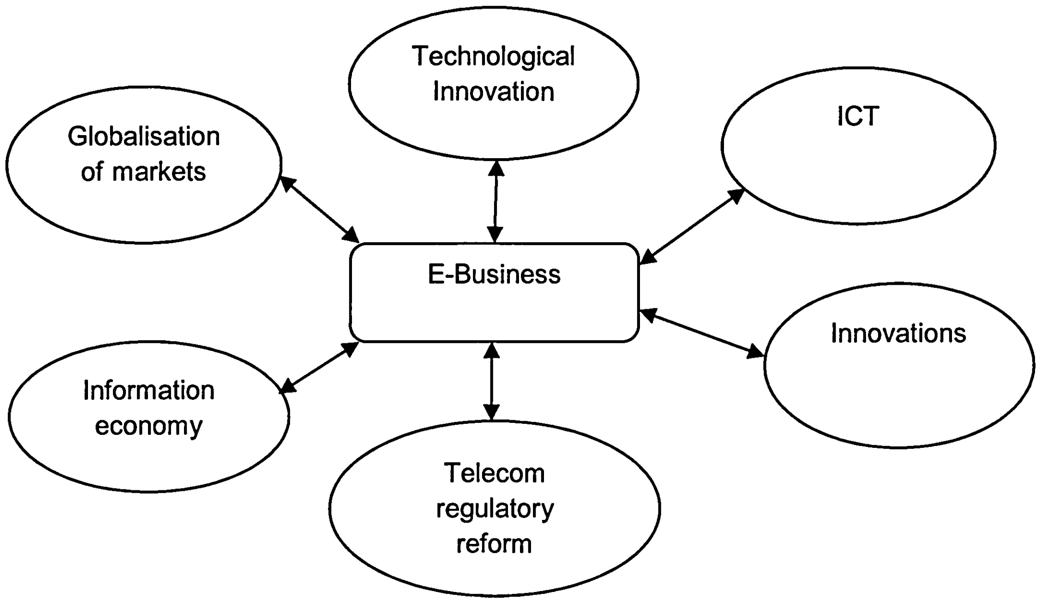
2.6. Electronic business

Laudon and Traver (2001) define E- Business as the digital technology that involves information systems in order to facilitate business operations and processes within a firm. Different types of E-Business methods include 'Business-to-Consumer (B2C), Business-to-Business (B2B), Consumer-to-Consumer (C2C), Peer-to-Peer or Mobile Commerce'. The B2B environment requires a closer relationship between customer and supplier (Wagner et al., 2003). E-Business is derived from the productive, creative logic behind the digital information economy. An E-Business is a flexible, adaptive enterprise which is designed for success in the information economy, enabling organisations to develop despite unexpected changes in an external environment (Moodley, 2001). E-management represents a management philosophy that demonstrates the main features of the global digital economy such as "*dynamic real-time decision-making, customer orientation, and speed in responding to market demands*" (Chandra et al. 2002, p.96).

Raymond and Bergeron (2008) argue that E-Business is now a 'standard' in industry. It is often referred to as the use of internet-based tools to support business activities of firms (Cagliano et al., 2005). Wagner et al. (2003) consider E-Business as a means of improving business potential. According to Moodley (2001), E-Business is basically an internet application. It includes "*information and communication technologies, software, protocols and standards for networking between computers*", which supports performing business processes (Moodley, 2001. p.35). According to him, E-Business emergence is a result of six major revolutions in the economy (Figure 2.3):

1. Technological Innovation;
2. Globalisation;
3. knowledge and information economy;
4. Appearance of Information and Communication Technologies (ICTs);
5. Innovations in business processes;
6. Telecom regulatory reform.

Figure **Error! No text of specified style in document.**.3. Main E-Business drivers



Source: Moodley (2001)

E-Business is considered as emergence of new economic intermediaries which creates opportunities for innovation. It offers different ways to respond to market demands and facilitates business processes as well as developing new mechanisms for coordination and execution. E-Business allows companies to improve operations and information flow as well as creating information systems that connect various supply chain parts including pricing, design and production, suppliers and customers (Simchi et al., 2004). In other words, E-Business practices enable companies to develop a strategic and effective customer-supplier relationship, and improve the responsiveness to uncertainty and diversity in the business environment (Koh and Maguire, 2004).

It is argued that E-Business applications enable companies to electronically perform their business activities, as well as integrating their E-Business systems and processes within the supply chain (Wiengarten et al., 2011). According to Damanpour (2001), E-Business generates new market opportunities through electronic channels, enabling companies to reduce operation costs and delivery times as well as improving customer services. Furthermore, E-Business facilitates integration of business processes and information flows as well as enhancing business operations in all organisational levels (Stevens, 1989, cited in Cagliano et al., 2005). Subsequently, increased supply chain integration, in turn, leads to greater cooperation across supply chains (Frohlich and Westbrook, 2002).

Based on Croom (2005), electronic business can be applied for the following purposes:

- Supply chain integration;
- Cost reduction and price pressure;
- Knowledge management;
- Controlling intellectual property and information flow;
- Change management;
- Managing global customers and suppliers;
- E-procurement;
- Lead time management

Leon-Pena (2008) considers E-commerce as "*part of wider E-Business applications*" (p.80). E-commerce, specifically, refers to the use of internet technologies and the World Wide Web for exchange of information, money and generating profit. He argues that E-commerce is an inherent component of Build-To-Order (BTO), considering the fact that E-commerce has brought about 'real-time communications' between different parts of supply chain. Just-in-time (JIT) practices and the most advanced computerised versions of Enterprise Resource Planning (ERP) are needed for BTO (Murillo, 2001).

Stages of E-commerce dissemination, according to Murillo (2001), are: incipiency or informational stage; dissemination or B2C; and profitability or B2B.

1. Incipiency or informational stage (there is an interest in the internet)
2. Dissemination or B2C (the internet is accepted and its value is recognised)

3. Profitability or B2B (the internet is used in supply chain applications, representing complete acceptance).

Based on the study of Wiengarten et al. (2011), in order for a firm's E-Business application to result in improved operational performance, a 'collaborative approach' throughout the supply chain is needed. In other words, the importance of E-Business applications should be realised by all parties in the supply chain. For instance, the information systems create value for a company if all supply chain parties equally realise the significance of E-Business applications for their success.

2.6.1. E-Business in the context of SCM (Electronic supply chain management - ESCM)

The evolution of E-Business practices in SCM goes back to the 1970s, when EDI and computer-to-computer digital communication began to displace the traditional forms of data and information interchange (direct-link telephones and mailed invoices) (Murillo, 2001). E-Business creates new competitive and strategic dimensions for SCM, where success of companies is defined by concepts such as ‘innovation’, ‘speed’, and ‘technological knowledge’. Most importantly, E-Business expands the scope of supply chain analysis as a strategic focus for leading firms (Simchi et al; 2004). Many industries, including manufacturing and retailing, are investing in E-Business to change and streamline their business processes and supply chain operations (Dong et al., 2009). E-Business has a significant impact on the relationships, coordination and structure of supply chains (Giannakis and Croom, 2004). It is argued that business operations such as communication, transaction, environmental scanning and collaboration are now done through information systems (Luftman et al., 2006).

Hwang and Lu (2013) define ESCM as the "*systematic and strategic coordination*" of the key inter-organisational supply chain processes (p.676). In another definition by Giménez and Lourenco (2008, p.313), ESCM is referred to as “*the impact that the internet has on the integration of key business processes from end-user through original suppliers that provides products, services and information that add value for customers and other stakeholders*”.

Electronic Supply Chain Management (ESCM) is considered as a critical element of companies' supply chain strategies (Boyer and Hult, 2005; Liu et al., 2010). ESCM, as "*physical implementation of SCM process*", enables organisations to integrate their supply chain operations through the use of IT (Wu and Chuang, 2010, p.103). According to Lee and Whang (2001), the impact of E-Business can be found in four key aspects of SCM:

- Information integration;
- Planning synchronisation;
- Workflow coordination;
- New business models.

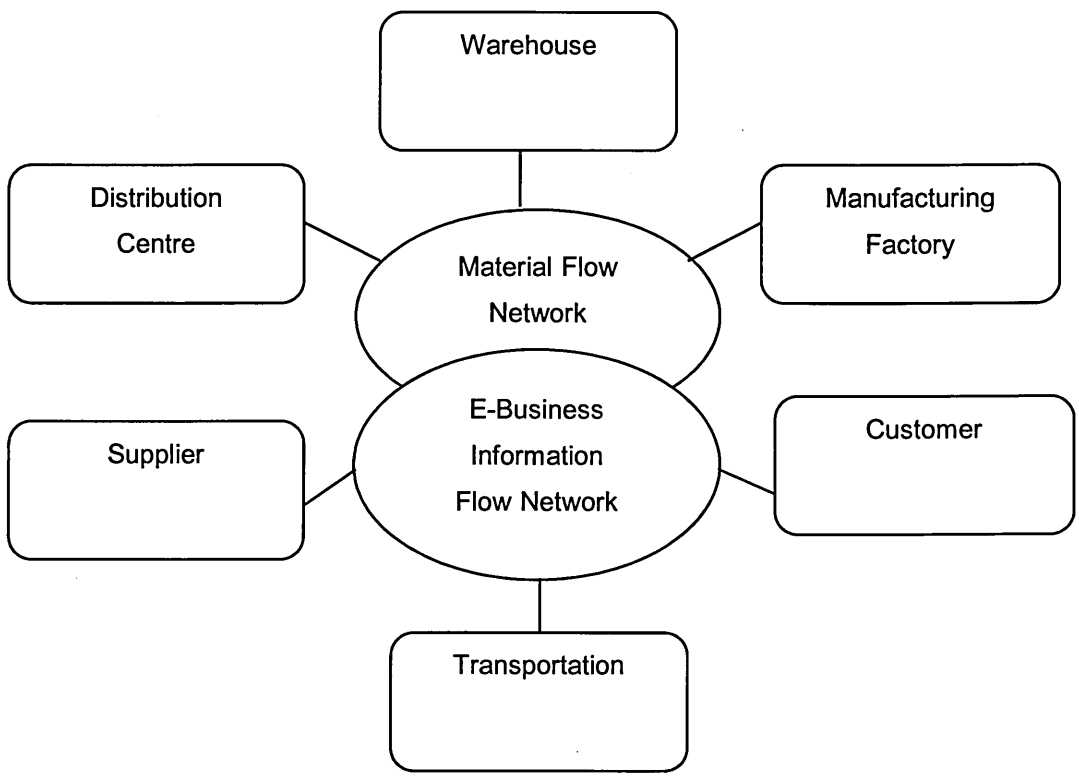
The emergence of E-Business has influenced the coordination of supply chains. Information technologies have changed customer contact mechanisms and information flows. They have enabled organisations to gain immediate feedback from customers and markets and to share information with suppliers as well as collaborating on decision-making throughout the supply chain. This improved level of coordination considerably increases the dependencies among different stages of supply chains, creating significant challenges in strategic positioning, planning, and execution (Simchi et al., 2004).

Electronic communication systems such as EDI, which is the first tool widely used along with supply chains, allow organisations to reduce the coordinating costs of both economic transactions and production. While, more recently, internet-based applications seem to be more applicable in supply chain integration (Malone et al., cited in Cagliano et al., 2005). Leon-Pena (2008) states that EDI facilitates information exchange through "*invoices, purchase orders, shipping bills and product stocking numbers*" (p.82).

Some scholars argue that, despite the economic crisis, companies are increasingly applying E-Business applications such as electronic auctions, electronic catalogues, and customer relationship management applications to simplify their business processes and integrate their supply chains (Kraemer et al., 2006; Dong et al., 2009; Rai and Tang, 2010).

Integration of E-Business and supply chain management enables efficient information sharing between suppliers and customer service network through networked information systems (Wohlwend and Fulton, 2005; Cheng and Lin, 2004; Lee, 2003). Networked information systems lay the foundation for an efficient material flow network from customer order to production, storage, distribution and delivery. These systems enable data and information related to demand, supply, and inventory to be made visible and communicated to all parties in the supply chain (Figure 2.4). However, the challenges of environmental uncertainty and dynamics of the enterprise create difficulties for the efficient management of the supply chain (Yin and Khoo, 2007).

Figure **Error! No text of specified style in document.**.4. Framework of an E-supply chain



Source: Yin and Khoo (2007)

2.6.2. Potential benefits of E-Business in supply chain management

Nowadays E-Business is considered as a "*key enabler to drive supply chain integration*". Internet technologies result in gaining "*global visibility across extended network of trading partners*", as well as enabling companies to respond quickly to emerging market demand. In other words, adopting information technologies for enhancing supply chain integration leads to "*efficiency improvements, better asset utilisation, reduction in total order fulfilment times, enhanced customer service and responsiveness, penetrating new markets, higher return on assets, and ultimately, higher shareholder value*" (Lee and Whang 2001, p.1-2).

Moodley (2001) argues that E-Business benefits companies mainly in two areas of value creation and cost control. Automated order and execution processes reduce operational costs and allow companies to have access to real time information, and improve supply chain performance through enhanced efficiency. The interrelated networks resulting from E-Business allow for faster product development and distribution as well as advanced product quality by providing up-to date information for customer configuration and manufacturing systems.

According to De Boer et al. (2002), purchase process efficiency gains and price reductions are the main benefits of E-Business in the area of procurement. Similarly, Damanpour (2001) argues that the most important benefit of E-Business technologies in a supply chain includes cost reductions and improvements in efficiency of operations. He argues that E-Business allows for improved and faster data and information analysis by managers, leading to "*more efficient production, better financial planning, inventory, distribution, marketing and sales as well as more effective R&D and product development*" (Damanpour, 2001, p.21).

An ESCM system can improve SCM by allowing effective communication between companies in the supply chain as well as providing easy access to information generated. Furthermore, reducing the problem of information overload is considered to be another advantage of E-supply chains (Leon-Pena 2008). Similarly, Shahidan and Netadj (2008) argue that an E-supply chain model introduced by companies will enhance communication and exchange of knowledge and information sharing in a supply chain, enabling the supply chain network to act as a 'single entity', which, in turn, will improve the competitiveness of companies in a changing environment.

According to recent scholars, such as Autry et al. (2010) and Liu et al. (2010), the strategic and operational improvements in communication, coordination, and collaboration are some of the most frequently mentioned advantages of ESCM. In other words, E-Business leads to enhanced integration and collaboration within the supply chain (Johnson and Whang, 2002; Lancioni et al., 2003; McIvor and Humphreys, 2004).

Ho (2009) classifies the benefits of E-Business in SCM as following;

- Improved speed of response
- Cost savings
- Improved communications
- Information and knowledge sharing
- Reduced inventory
- Efficiency and productivity improvements
- Harmonization and standardization of procedures

More detailed advantages of adoption and implementation of E-Business technologies based on Moodley (2001) are summarised in Table 2.1.

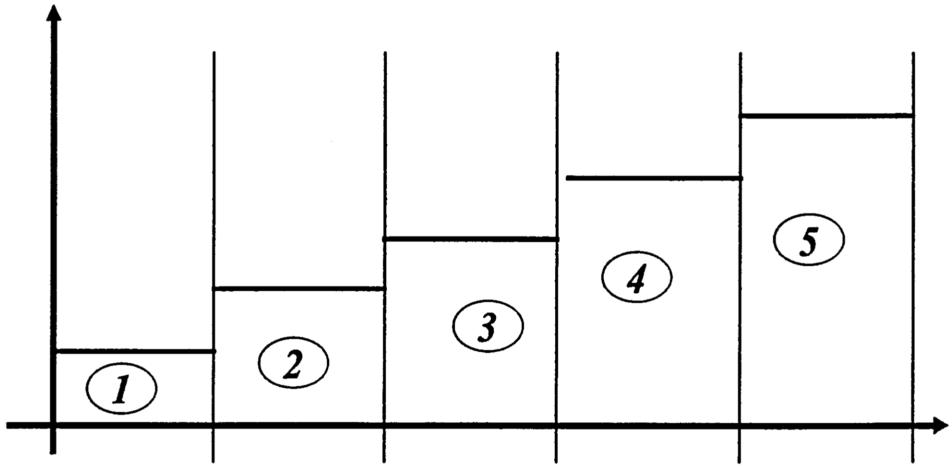
Table **Error! No text of specified style in document.**.1. The potential advantages of adoption and implementation of E-Business

• Improved SCM • Increased revenues • Lower production cycle times • Improved customer service • Increased market share • Creating interactive relationships with customers and suppliers • Faster and improved delivery of new products and services • Improved market transparency • Huge cost savings resulting from standardisation and process efficiencies • Increased value resulting from efficient management of resources • Reduced inventory levels • Improved planning • Huge savings in execution costs, through efficiency gains • Enhanced information on performance of suppliers • More complex collaboration and cooperation in design, product development and fulfilment • Improved communication between trading partners and within the enterprise itself (inter-firm and intra-firm relationships)

Source: Moodley (2001)

In a different approach by Lancioni et al. (2003), the benefits of E-Business in supply chain management are identified through different stages of ESCM development. According to Lancioni et al., (2003), E-Business development in SCM follows a 'five phase evolutionary model' which represents E-Business practices applicable to SCM and emphasises the development of E-Business in support of SCM (Lancioni et al., 2003; Croom, 2005) (Figure 2.5).

Figure **Error! No text of specified style in document.**.5. E-Business in the supply chain – five phases of evolution



Focus	B2C'	B2B'	Re-engineering Process	B2X'	Pipeline Transparency
Systems	Email, Web, EDI	CRM	Resource Planning	E-Procurement	E-Fulfillment
Processes	Sales to Payment	Relationship Management	Process Planning and Control	Supply Base management,	Integrated Logistics
Strategies	Sales growth	Strategic Account Management	Operations Improvement	Procurement	Supply Chain

Source: Croom (2005)

Different phases focus on various aspects of business: phase one (customer management) focuses on enhanced access to customers and markets using standard E-Business systems such as e-mail and web sites. This phase results in sales growth, enhanced control over revenue flows and utilisation of standard web-based infrastructures. Phase two (process management) emphasises improved management of customer relationships using CRM systems and internal customer intelligence'. Phase three (procurement) focuses on using E-Business systems such as ERP which leads to efficient processes and improved operations. Whereas, phase four (supply chain integration) emphasises integrating supply chain processes, deploying E-procurement systems in order to improve cost management. Finally, the last phase (customer acquisition) focuses on integrated ESCM using E-Business platforms such as E-fulfilment, global positioning and order tracking in support of materials management (Croom, 2005).

2.6.3. E-Business capabilities in SCM

E-Business capabilities are considered to be a source of competitive advantage (Bharadwaj, 2000). In other words, E-Business capabilities developed by organisations are recognised to be critical to their success (Luftman et al., 2006). Three types of E-Business infrastructure applications include: E-Business interaction applications; E-Business coordination applications; and E-Business integration applications (Zhu and Kraemer, 2002; Barua et al., 2004).

E-Business interaction applications support the communication and information sharing via the internet (Gosain et al., 2005). E-Business coordination applications facilitate the planning and evaluation of supply chain processes and business operations. And, E-Business integration applications enable seamless exchange of information throughout supply chain by electronically integrating processes and information systems (Barua et al., 2004).

Yin and Khoo (2007) emphasise the importance of intelligent coordination and a scheduling system, and argue that they are necessary for the optimisation of supply chain processes. Such systems enable an efficient materials flow network as well as removing the conflicts of different parties in the supply chain.

In another categorisation by Raymond and Bergeron (2008), different forms of development of E-Business capabilities in the organisation are recognised to include: E-communication; E-intelligence; E-commerce; and E-collaboration. E-communication, refers to improvements in products and services and communication with customers and suppliers through the use of web sites, brochure ware, online catalogues, and other types of internet uses (i.e. intranets and extranets) (Turban et al., 2012). E-intelligence has to do with enhancements in operations and decision making as well as creating new product-market opportunities. The internet enables firms to scan their technological, commercial and competitive environment (Hill and Scott, 2004). E-commerce refers to buying and selling of products and services through the internet and web-based technologies (Rayport and Jaworski, 2001). And, E-collaboration is concerned with integrating and sharing data, through the internet or extranets. Upstream and downstream value chain process are integrated through cooperation and sharing information, allowing various parties in the supply chain to cooperate with each other in the development and design of products (Cassivi et al., 2004). Barratt and Green (cited in Barratt, 2004) emphasise collaborative culture among trading partners in the supply chain, which requires the openness of different parties in the supply chain with regard to the knowledge and data sharing.

E-Business capabilities are classified under some other categories. Based on the business processes they support, E-commerce and E-collaboration would be classified as relational, since they focus on creation of strong relationships, whereas, E-communication and E-intelligence would be considered as informational, since they emphasise organisational learning as source of competitive advantage (Amit and Zott, 2001). Moreover, based on the managerial and decision making level, operational level applications include E-communication and E-commerce, whereas E-intelligence and E-collaboration would be placed at the strategic level (Karagozoglu and Lindell, 2004).

E-Business capabilities allow manufacturing companies to be more productive in a number of ways. E-commerce effects profitability and productivity through networked business processes. E-intelligence leads to improved productivity by improving "*the reach and richness of the market*" and "*technological and competitive intelligence*". And, E-collaboration enhances the resources and competencies of supply chain parties within electronic supply chain processes, and consequently results in productivity improvements (Raymond and Bergeron, 2008, p.588).

Lord (2000) argues that E-Business provides optimal integration of different parts of the supply chain. According to him, E-Business technologies assist companies in developing flexible E-Business strategies which allows companies to perform their future expectations and create competitive advantage by improving customer satisfaction.

2.6.4. E-Business and competitive advantage in SCM

As discussed earlier, in the new economy, competition is based on supply chains rather than the organisation itself. Therefore, supply chain integration is a significant source of providing competitive advantage and is considered to be essential for the success of companies. In other words, closer attention to management of a supply chain can create competitive edge for organisations. Electronic networks can create a competitive edge by decreasing production costs, and by improving responsiveness through removing communication boundaries (Moodley, 2001).

According to Porter (1980), the competitive advantage of an organisation is created by the cooperation of various business operations rather than being found in a particular core capability. Christopher (1998) considers 'customer service' and 'cost reduction' as two main strategic objectives. Similarly, the study of Croom (2005) indicates that cost reductions lead to customer satisfaction, which, in turn, will result in achievement of competitive advantage.

Large customers create ‘competitive cost pressure’ which requires companies to employ E-Business strategies and technologies. This, in turn, will bring about significant improvements in customer service, and, finally customer satisfaction. Avlonitis and Karayanni (2000) contend that E-Business contributes to offering value added services to the end customer, and improves the supplier-customer relationship. This new form of business provides significant opportunities for enhancing collaborative relationships across a supply chain and improves internal service quality (Stanley and Wisner, 2002). Furthermore, Wang and Wei (2007) argue that the collaboration resulting from strategic and unique resources and capabilities in the supply chain will result in creating value and sustainable competitive advantage for companies which will bring about major performance improvements.

Efficiency and responsiveness, in terms of taking advantage of opportunities, are becoming more and more vital for companies, considering the ease of transactions for customers via the Internet (Leon-Pena, 2008). Electronic and internet based networks have facilitated these by creating networked and cooperative systems which are based on effective knowledge and information sharing.

2.6.4.1. E-Business strategy in SCM

Cagliano et al. (2005) argue that, given the variety of internet applications, companies can take advantage of internet tools "*only by defining a clear E-Business strategy*" (p.1144). Chaffey (2007) argues that E-Business strategies should communicate the benefits of using electronic networks in achieving E-Business goals. Moreover, E- supply chain strategies should support the overall strategy and address market drivers and their impacts on the company (Hitachi Consulting Corporation, 2006). Turban et al. (2012) define E-Business strategy as creating a method of running business through the use of electronic networks. According to them, E-supply strategies should be in line with corporate goals as well as other business activities such as marketing, finance, human resources and information system strategies. Damanpour (2001) argues that E-Business strategies create a way of coordinating the supply chain and integrating managerial and technological factors.

E-channel strategies allow companies to develop a series of communicational objectives and strategies through information technologies such as the internet. In other words, E-channel strategies guide the employment of electronic channels and demonstrate how different electronic networks operate as a part of a multichannel E-Business strategy (Chaffey, 2007). It is argued that internet technologies need to be integrated in coherent strategies of SCM in order to support business processes effectively (Cagliano et al., 2005). Similarly, Raymond and Bergeron (2008) argue that the internet and web-based technology must be compatible with organisational strategy in order to create a significant competitive advantage. Therefore, IT capabilities (E-communication, E-commerce, E-intelligence and E-collaboration) need to be aligned with the business strategy in order to be effective and create value and competitive advantage (DeSarbo et al., 2005).

Alignment of information technology with the firm's business strategy is one of the main challenges faced by IT managers, and companies need to consider the technological and operational challenges as well as costs of training and continuous updating of systems (Luftman et al., 2006). In a typology of business strategy suggested by Miles and Snow (1978), the terms prospector, defender and analyser are included. Prospector firms are innovative in terms of product and market development as well as introducing new technologies. These firms emphasise product and market innovation. Defender firms are 'engineering-oriented' and attempt to keep their position in a 'relatively stable market'. So, these firms mainly focus on efficiency of business processes and cost of production and sales. On the other hand, analyser firms choose superior strategies based on a *"trade-off between the minimisation of risk and the maximisation of business opportunities"*. Analysers stress flexibility in order to assure innovation and process efficiency. Therefore, different E-Business capabilities would be appropriate for each type of business strategies (Raymond and Bergeron, 2008, p.580), which will be discussed more in depth in the following section.

- Defenders

Defenders target relatively secure niches in the market. Their competition is based on effectiveness and emphasis on high-quality and low-cost products and services as well as speed of delivery. The engagement of defenders in developing new products, services and markets is very low (Hambrick, 1983; Doty et al., 1993). These firms make little use of technologies; however, they make investments in infrastructure and equipment. They employ technologies such as EDI and ERP for integration of their manufacturing processes in order to reduce their costs, improve their productivity and supply chain efficiency, and enhance their customers' satisfaction (Markus, 2000). Therefore, from the point of view of strategic alignment, and based on the study of Raymond and Bergeron (2008), E-communication and E-commerce would be 'ideal' E-Business capabilities for defenders. It is argued that defender SMEs obtain greater business performance by applying these E-Business capabilities.

- Analysers

Analysers attempt to enhance operations by doing a detailed market analysis. They need to focus on the successful products on the market, and enhance the integration of their business processes. Analysers try to take advantage of 'occasional or emerging product/market opportunities'. Their need for operational effectiveness requires them to develop technologies that facilitate the flexibility of their production and distribution processes, allowing them to take advantage of emerging customer requests (Beach et al., 2000). Given the operational functions of analysers, E-communication, E-commerce, and E-intelligence would be suitable for this type of business strategy. Subsequently, analysers who have developed all of these business applications will see improved performance in their business operations (Raymond and Bergeron, 2008).

❖ Prospectors

Prospector SMES focus their strategy on development of new products and new markets which requires flexibility in their product line as well as responsiveness to new demands (Hambrick, 1983). So, these firms need to constantly develop new products and services and pay more attention to Research and Development (R&D) (O'Regan and Ghobadian, 2005). They need to collaborate with other parties in the supply chain in order to ensure successful development and launch of new products and services (Lee and Chang, 2007). Prospectors emphasise environmental scanning in order to adapt to turbulent changes in the business environment (Daft and Weick, 1984). They need to improve their innovation capacity and flexibility and decrease the lead time of new products. Considering the fact that they apply more complex coordination and communication mechanisms, E-communication, E-commerce, E-intelligence and E-collaboration are believed to be appropriate E-Business capabilities for prospectors (Aragon-Sanchez and Sanchez-Marın, 2005).

2.6.5. Theories of E-Business adoption in supply chain

There are a number of academic theories relating to E-Business adoption in the supply chain. 'Theory of Diffusion of Innovation' (Rogers, 2003) and the 'Technology-Organisation-Environment (TOE) model' (Tornatzky and Fleischer, 1990) have both focused on the study of E-Business adoption based on adoption of innovation (Ngai and Gunasekaran, 2004; To and Ngai, 2006). Damanpour (1992) describes innovation as something new to the adopting organisation.

2.6.5.1. Rogers's Diffusion of Innovation Theory

This theory suggests that companies need to consider following factors when adopting new innovations: relative advantage; compatibility; complexity; triabiliy; and observability. Relative advantage is concerned with the benefits created by new innovation compared to the innovation which is being replaced.

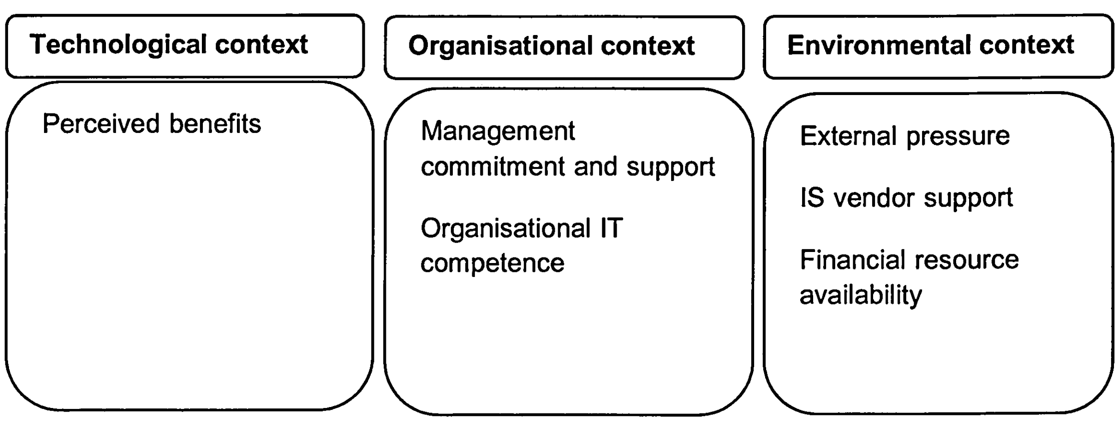
Compatibility is concerned with whether the innovation is suitable and compatible to the present values, needs and experiences. Complexity is about difficulty of practice or understanding of the innovation, and triability refers to the experiment of the innovation before its full deployment. And finally, observability is about visibility of the benefits of the innovation (Chong et al., 2009).

2.6.5.2. TOE model

This model investigates the adoption of new technologies based on organisational, technological and environmental factors. Organisational factor refers to size, centralisation, formalisation, quality of human resources, and complexity of the organisation's managerial structure. Technological factors investigate the relevant technologies to the organisation. And, external environment includes the industry, competitors, and accessibility to suppliers (Shen et al., 2004).

The TOE model integrates different characteristics of the technological, organisational and macro-environmental factors (Li et al., 2010). It includes factors such as "*perceived benefits, top management commitment, organisational Information Systems (IS) competence, external pressure, IS vendor support, and financial resources availability*" (Ifinedo, 2011, p.258) (Figure 2.6).

Figure **Error! No text of specified style in document.**.6. TOE model



Source: Ifinedo (2011)

'Perceived benefits' refer to the relative advantage provided by Information and E-Business Technologies (IEBT) which positively influence the adoption of internet technologies in SMEs. These benefits include improved relationships with suppliers and customers, increased revenue and operational efficiency (Iacovou et al., 1995; Ifinedo 2011). 'Organisational IS competence' is concerned with the level of organisational knowledge about technological innovations, which influences the adoption of new technologies (Raymond, 2001; Zhu et al., 2006). 'Management commitment/support' refers to top executive support and enthusiasm which is considered crucial for successful adoption and implementation of IEBT (Al- Qirim, 2007). And, 'external pressure' is related to the influence of external sources such as competitive pressure, supplier's pressure and customer's pressure (Chau and Jim, 2002; Chong et al., 2009). And finally, 'financial resource availability' refers to the ability to invest in complicated IS and IT structures (Love et al., 2001), and 'IS vendor support' is concerned with the support gained from external sources of technical expertise for implementation of IT applications (Premkumar and Roberts, 1999; Rogers, 2003).

Ifinedo (2011) investigated the acceptance of IEBT by SMEs. According to his study, perceived benefits, management commitment/support and external pressure will lead to successful adoption of E-Business technologies in SMEs. While, the organisational IT competence, IS vendor support and the availability of financial support do not facilitate the acceptance of IEBT (Adshead, 2001).

2.6.6. Critical success factors and major issues in ESCM

Cain (2001) argues that an E-strategy framework that is based on following a customer centric approach and acquiring the right technology at the right time is necessary for the success of E-Business. In other words, understanding customers' expectations and needs, and considering the cultural and social implications of business processes, products and services are essential when adopting new E-Business technologies. Furthermore, companies need to be able to integrate various information technologies used within a supply chain and define a clear scope of business as well as communicating their business vision and strategy to all parties in the supply chain. Cagliano et al. (2005) state that "*coherent set of different tools and relevant structural changes*" are needed for the integration of "*the physical and the virtual supply chain*". This, in turn, will result in successful implementation of Electronic supply chain management (p.1145).

According to Damanpour (2001), dynamic and just-in-time collaborations and responsiveness lead to success in companies. Moreover, he suggests flexibility of E-Business and speed are important factors, especially due to "*changing business environment and increased global competition*". Furthermore, he argues that conducting business quickly, accurately and flexibly in 'internet time' requires companies to create flexible strategies and E-supply chain models (p.26).

Wiengarten et al. (2011) contend that 'co-creating IT value' is a significant factor underpinning the success of E-Business systems in supply chains. According to Kohli and Grover (2008), co-creating IT value is defined as IT value created through actions and collaborative relationships of various parties. Emergent values are subsequently shared to maintain co-creation. Moreover, according to Hwang and Lu (2013), successful ESCM requires systematising and redesigning existing business processes in order to ensure improvement of long-term performance and achievement of the utmost possible benefits.

One of the major difficulties of building ESCM system relates to the integrating technology used by the various parties in the supply chain. For instance, a software system used by a company will not integrate easily with supplier technologies. This problem requires a change in the parties' system in order to allow integration, which, in turn, might incur huge financial costs. Therefore, companies need to adopt systems that will enable integration with the whole supply chain. Privacy and safety in terms of data sharing seem to be additional concerns to the building of E-supply chain systems. Moreover, the development of ESCM systems is a long process, which involves a large input of time and money, while not necessarily being profitable initially (Leon-Pena, 2008).

2.7. Inter organisational networks

Most supply chains are actually 'networks'. These supply networks or supply web can be used to explain supply chain structures (Chopra and Meindl, 2012). In other words, supply chain management includes networks of suppliers and channels of distribution. Increased competitiveness requires companies to integrate within a network of organisations which emphasises the role of SCM, and companies that ignore this challenge will fall behind their rivals (Giménez and Lourenco, 2008).

A network is a dynamic connection of inter-related units (Castells, 1998). Information technologies embedded in a network provide the basis for organising business processes. It is argued that "*the bedrock of E-Business is the network, which is the physical interconnection of IT devices to enable seamless information transfer and access within the enterprise. This ensures maximum benefits to applications in the supply chain process*" (Moodley, 2001, p.665). E-Business and information technology infrastructures support integrated networks and allow companies to take advantage of reduced costs and inventory levels as well as improved customer service (Vakharia, 2002; Muffatto and Payaro, 2004).

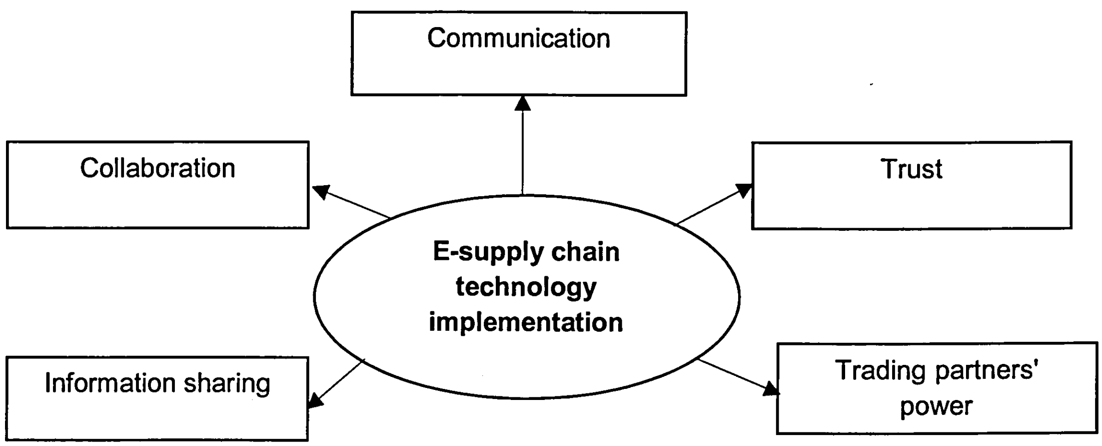
In the new economy, companies need to create complex business relationships and underlying technology infrastructure in order to support their global strategies. E-Supply Chain Networks (E-SCNs) allow companies to create collaboration among their networks to achieve shared objectives, which, in turn, will basically change the global business environment. In order to design an efficient SCN, it is crucial to efficiently manage production, business process, and resources. "*Mass customisation of custom-orders*" significantly influences product development. Moreover, it is also vital to manage the production process with "*minimum cost overlays and maximum resource utilisation*". The characteristics of an effective SCN are improved connectivity, alignment of inter-organisation networks, and enhanced information sharing (Chandra et al., 2002, p.96).

Some of E-Business systems (inter organisational system penetration) are e-mail, Web sites, electronic funds transfer, Electronic Data Interchange (EDI), knowledge sharing, customer relationship management, enterprise resource planning, E-procurement, intranet, extranet and middleware (software used to integrate two systems) (Croom, 2005). Benefits of inter-organisational networks, according to Johnson and Vitale (1988), include enhanced efficiency, reduced costs, creating commitment between trading partners, and allowing customisation of products and services.

2.7.1. Inter Organisational Relationships (IOR)

Shang et al. (2005) and Huang et al. (2008) argue that Inter Organisational Relationship (IOR) influence significantly the adoption of Inter Organisational System (IOS) such as electronic networked systems and E-Business. Chong et al. (2009) investigated the impact of inter-organisational relationship factors of trust, communication, collaboration, information sharing and trading partner's power on adoption and implementation of E-supply chain technology in companies. These factors are illustrated in Figure 2.7.

Figure **Error! No text of specified style in document.**.7. E-supply chain technology implementation



Source: Chong et al. (2009)

2.7.1.1. Communication

In order to implement E-Business technologies in the supply chain, companies need to establish efficient communications between the supply chain partners (Chong and Sastry, 2006). In other words, it is believed that the employment of E-Business technologies in a supply chain will enhance inter-organisational communication, resulting in closer supply chain relationships. The lack of effective relationships and standard data representation schemes are some of the main barriers to communicating information along the supply chain (Chong et al., 2009). Companies, in order to create successful supplier-customer relationships, need to be able to "*transfer accurate, relevant, and understandable information, openly and promptly*" (Icasati-Johanson and Fleck, 2003, p.595).

2.7.1.2. Collaboration

Supply chain collaboration concentrates on achieving mutual goals that would not be easily achieved alone (Tucker, 2008; Bajgoric and Moon, 2009). Different parties in the supply chain work collaboratively together and attempt to meet the various demands of their market. They focus on enhancing productivity and improvement of quality and delivery of their products and services as well as customer satisfaction. Based on the ideas of Granot (1997), companies can improve their inter-organisational collaboration by effectively contacting and interacting, and creating "*joint programs and written agreements*" between different partners (p.307).

2.7.1.3. Information sharing

The success of adoption of E-Business technologies depends on levels of information sharing (Shen et al., 2004). Successful SCM requires effective information sharing (Icasati-Johanson and Fleck, 2003). Sharing information such as inventory, sales, demand forecasts, order status, product planning, logistics and production schedule can improve supply chain operations (Chong et al., 2009).

2.7.1.4. Trust

Trust has a significant role on the adoption of inter organisational systems (Yang and Jarvenpaa, 2005; Lam et al., 2008). In other words, trust between different parties of the supply chain is a main facilitator of inter-organisational relationships which require a positive expectation of future behaviour as well as "*integrity, competence, fairness, loyalty and openness*" between trading partners (Clark and Payne cited in Icasati-Johanson and Fleck, 2003, p.596). Based on the study of Ratnasingam (2001), trust is of significance for long-term relationships and cooperation of different parties in the supply chain.

2.7.1.5. Trading partners' power

Power is described as the ability of a firm to affect other firms to perform in a certain way (Ratnasingam, 2000). According to Jun et al. (2000), this kind of buyer-supplier relationship creates dependency between different trading partners and has a significant role in the adoption of electronic systems.

2.8. Co-creating E-Business value in supply chain and performance improvements

E-Business value is co-created in supply chains through the interaction of the supply chain partners' E-Business systems. In other words, improved operational performance happens through combining and integrating a firm's E-Business systems with its suppliers' E-Business systems (Kohli and Grover, 2008; Wiengarten et al., 2011). The Resource Based View (RBV) has been the leading theoretical concept guiding E-Business value research (Nevo and Wade, 2010). The RBV identifies major resources of firms and their impact on organisational performance. Resources can be a source of sustainable competitive advantage by creating the basis for competition among companies. Resources are described as "*tangible or intangible*" factors of production that companies have control over (Helfat and Petraf, 2003, p.999).

E-Business resources on their own are not a source of sustainable competitive advantage or significant performance improvement since they do not simultaneously fulfil VRIN conditions (in terms of being Valuable, Rare, Imitable and Non-substitutable) (Powell and Dent-Micallef, 1997; Melville et al., 2004). In other words, E-Business resources and applications on their own only engage resources in electronic business processes throughout the supply chain and do not result in performance improvements (Barua et al., 2004; Devaraj et al., 2007). E-Business resources need to be applied and integrated throughout the supply chain in order to be a source of significant performance improvement. In other words, the E-Business applications can only become a source of competitive advantage throughout the supply chain when integrated and implemented by all supply chain members (Wiengarten et al., 2011).

In order for E-Business systems to reach their full performance potential, companies need to interact and cooperate with E-Business systems of their partners throughout the supply chain (Barua et al., 2004). In other words, total performance improvements of the supply chain happen when all links in the supply chain are simultaneously optimised (Burke and Vakkaria, 2010). Saraf et al. (2007) argue that some IS applications require customers and partners capabilities in order to create value.

Coordinated planning and business operations within supply chain activities provide better access to information, enhance efficient management and decrease 'non-value added activities', resulting in performance improvements (Germain and Iyer, 2006; Rodrigues et al., 2004). Operational improvements contribute to "*top-line and bottom-line financial performance gains*" such as improved customer delivery, reliability and inventory turnover rates, allowing companies to gain the outcome goal of SCM which is concerned with creating a competitive edge for companies (Iyer, 2011, p.88).

'IT business value' research is concerned with the investigation of the effects of E-Business on organisational performance, and studies the efficiency and competitive impact of IT on performance (Melville et al., 2004). According to Wiengarten et al. (2011), IT business value research investigates the impact of IT applications, such as E-procurement systems, ERP, and EDI systems, on performance.

Studies such as Rodrigues et al. (2004), Sanders and Premus (2005), and Rai et al., (2006) have found a positive relationship between supply chain integration and performance. Devaraj et al. (2007) used process integration in supply chains to analyse the effect of E-Business technologies on operational performance. According to their investigation, E-Business technologies do not influence performance directly; however, they facilitate customer and supplier integration which result in positive impact on performance. Another study by Power et al. (2010) investigated the effects of electronic markets on operational performance. Based on this study, electronic markets appear to integrate trading partners' business processes through collaboration and enabling access to data online, and, in turn, result in operational performance improvements.

Quality of IT systems does not significantly impact on competitive advantage in organisations (Bhatt and Grover, 2005). Similarly, some other studies have identified that IT and E-Business resources on their own do not significantly improve a firm's performance (Powell and Dent-Micaleff, 1997; Melville et al., 2004; Nevo and Wade, 2010). Ray et al. (2005) argue that IT has little direct impact on a firm's performance unless it is coupled with investments in work practices, human capital, and organisational restructuring. In other words, if E-Business resources are combined with other resources such as human resources or additional IT resources, they can lead to performance improvements (Melville et al., 2004; Kohli and Grover, 2008).

What is more, an E-Business 'value creation process' along the supply chain is influenced by the E-Business system of key suppliers (Wiengarten et al., 2011). Suppliers' E-Business readiness is argued to indicate IT readiness and the capability of companies in terms of conducting their business operations electronically (Barua et al., 2004). Moreover, E-Business applications will not be able to reach their full performance potential if their IT systems are not coordinated with suppliers' investments on IT (Nevo and Wade, 2010). In addition, suppliers need to feel comfortable and be knowledgeable in order to use sophisticated internet technologies (Barua et al., 2004).Therefore, in order for E-Business systems to reach their full potential and achieve performance improvement, all supply chain parties need to be able to conduct their business electronically. In other words, "*the extent to which E-Business applications such as E-Business interaction, coordination and integration applications improve a firms' operational performance depends to a significant extent on its key suppliers' E-Buiness readiness. In fact these E-Business applications do only improve a firm's performance significantly when its key suppliers' have a high level of E-Business readiness*" (Wiengarten et al., 2011, p.19).

2.9. Role of Internet in Supply Change Management

The internet has a fundamental impact on how organisations conduct their business functions in addition to having an impact on the performance of a firm and the structure of an industry. It has the potential to revolutionise the way in which companies fulfil their business objectives and compete. The internet is based on network systems which create opportunities for manufacturing companies in developing countries in terms of "*catching-up and forging ahead types of development*" (Moodley, 2001, p.10). Companies which use the internet in their business process have relatively higher payoffs compared to non-adopters. Moreover, information sharing and communication within the supply chain of these companies is very developed and enhanced (Cagliano et al., 2005).

The advent of the internet and information technology, interrelated networks, web enabled systems and rapid data processing have enabled the rapid growth of E-Business in all kind of organisations (Koh and Maguire, 2004). The emergence of the internet has provided the opportunity to improve performance and increase revenue generation (Turban et al., 2010; Weisberg et al., 2011). Internet and E-Business Technologies (IEBT) such as email, online business operations, and webpage ownership are applied to support E-Business activities and processes (Ifinedo, 2011). Yin and Khoo (2007) argue that IEBTs enable a powerful supply chain planning and control system which allows E-Business information flow network to share data efficiently, and results in effective communication and collaboration of different parties in the supply chain.

Internet technologies result in improvements in business transactions and relationships between business partners (Hadaya, 2006). The internet facilitates collaboration between different parties in the supply chain, through creating information networks, resulting in massive cost saving efficiencies (Adshead, 2001). Similarly, Durkin and McGowan (2001) state that internet technologies assist relationships through effective information and data exchange between parties in a network. The internet enables supply chain partners to access and share information as well as having access to knowledge sharing systems such as data analysis and modelling, which allows for enhanced planning and decision making (Swaminathan and Tayur, 2003).

Taylor and Murphy (2004) refer to the unique qualities of the internet as 'ubiquity'; 'interactivity' (the ability to collaborate efficiently); 'speed' (the ability to react quickly); and 'intelligence' (the ability to store and process information). These qualities provide new ways of managing value chains and offer new marketplaces for organisations (Kenney and Curry, 2001).

Internet technologies have created low-cost online opportunities for companies, having created the possibility for a new era of digitally-based trade and transaction and networked business operations (Moodley, 2001). The "*one-to-many*," "*many-to-one*," and "*many-to-many*" capabilities of the internet have improved the "*one-to-one*" nature of EDI, allowing rich and simultaneous exchange of knowledge between trading partners and enabling companies to have access to up-to-date information. The Internet can benefit companies by reducing the cost of access to information, increasing the value of that information and increasing audience size (Cross, 2000, p.38).

According to Giménez and Lourenco (2008), the internet and web-based technologies can provide companies with the ultimate benefits of:

- Reduced costs;
- Improved customer service through efficient communication with the customer;
- Enhanced customer satisfaction and competitive advantage;
- Improved forecasting and planning through collaboration with business partners;
- Efficient fulfilment process through having access to data and sharing information along the supply chain;
- Efficient product flow management through information sharing about demand and supply capacity;
- Improved efficiency of the procurement process.

However, the implementation of internet and web-based technologies creates some cultural and technical concerns. Collaboration requires complete trust and commitment and cooperative norms, which, in turn, necessitates companies to reveal at least some of their business secrets to their partners. Additionally, the insecure nature of the internet and the challenge of application integration among different parties in the supply chain is a significant technical concern facing companies (Chou et al., 2004).

Cagliano et al. (2005) argue that internet adoption is based on 'incremental strategies' that follow a series of stages ranging from limited to an extensive use of E-Business tools along the supply chain. These tools facilitate the integration of external and internal business processes. Supply chain integration mechanisms such as 'information sharing and system coupling' are examples of extensive adoption of the internet. Information sharing is concerned with exchange of information on business processes such as inventory, production, and delivery plans, while system coupling refers to the adoption of tools in coupling the interface between supplier and customer.

2.9.1. Benefits of integration of the internet and supply chain

Giménez and Lourenco (2008) distinguish between two types of impact of the internet on supply chain processes: 'internal effects' and 'downstream effects'. Internal effects refer to the impact of the internet on the 'focal company'. It is argued that all business parties will have access to same information about each customer in order to negotiate and relate with them (Giménez and Lourenco, 2008). The downstream effects arise from the impact of the internet on the relationships with customers. Web-based technologies allow companies to collect valuable data, which can be beneficial to customer relationship management (Sodhi, 2001). Moreover, the internet allows companies to offer new products and services to customers.

The use of the internet mainly for sales and customer care has been the frequent approach to the adoption of the internet at the beginning of the new economy (Van Hoek, 2001). In the 1990's, internet technologies enabled consumers to compare prices from different sources in addition to allowing them to find more distributors easily. In other words, the internet has "*shaken up the whole supply chain environment*" because of creating new information technology. It is argued that organisations attempt to create internal information systems in order to incorporate demand and customer requirements information into the whole business processes. This will, in turn, allow the organisations to achieve the goal of customisation and personalisation (Leon-Pena 2008, p.85).

Cagliano et al. (2005) classify internet applications into three different types: E-commerce; E-procurement; and E-manufacturing. E-commerce provides supports to downstream supply chain processes such as sales, distribution and customer service processes (Brynjolfsson and Smith, 2000). E-procurement is concerned with the adoption of E-Business in upstream supply chain process such as sourcing, procurement and order fulfilment processes (De Boer et al., 2002). And, E-manufacturing allows efficient demand and capacity planning, forecasting and internal supply chain integration (Kehoe and Boughton, 2001).

In other, quite similar, categorisation based on Lee and Whang (2001), internet tools are classified into E-commerce, E-procurement and, E-collaboration. The distinction here is that E-collaboration focuses mainly on improving supply chain relationships as well as information exchange and making joint decisions.

Giménez and Lourenco (2008) identify the main impacts of the internet on the supply chain to involve the impact on E-commerce, information sharing, and knowledge sharing. The impact of E-commerce allows companies to respond to the challenges posed by the internet on business deals conducted through the internet. The impact of information sharing helps companies to access and share information between different parties in the supply chain through the internet. And, the impact of knowledge sharing allows companies to access data analysis and modelling in order to facilitate efficient planning and decision making.

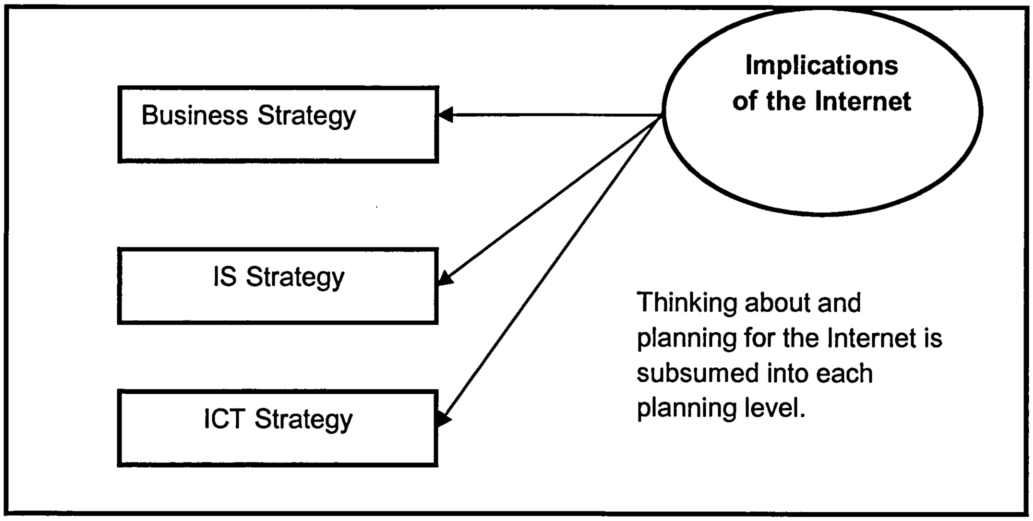
2.9.2. The internet and E-supply chain strategy

The studies of Cagliano et al. (2005) suggest that there are different degrees of adoption of the internet, which allow for integration of different business processes. The authors classify firms into four categories in order to highlight different E-Business strategies:

- Traditionals- in these firms there is no significant use of "internet-based technologies" within the supply chain;
- E-sellers- these firms adopt and implement internet technologies mainly for sales and customer service;
- E-purchasers- in these firms the internet is used mostly for the upstream operations such as purchasing and sourcing;
- E-integrators- they include the most advanced firms which adopt web-based technologies to a high extent in supply chain activities. These firms adopt the internet in all supply chain processes, from procurement to sales and create good communication networks within their supply chain (Van Hoek, 2001).

The internet, as one of the most influential technology innovations of the late twentieth century, has had a significant impact on all features of organisational strategy from formulation and implementation into producing, innovating and delivery of products, and customer relationship. Therefore, internet technologies need to be incorporated into all levels of strategy, which include: business strategy; IS strategy; and ICT strategy (Figure 2.8) (Turban et al., 2012).

Figure **Error! No text of specified style in document.**.8. Implications of the internet in strategy



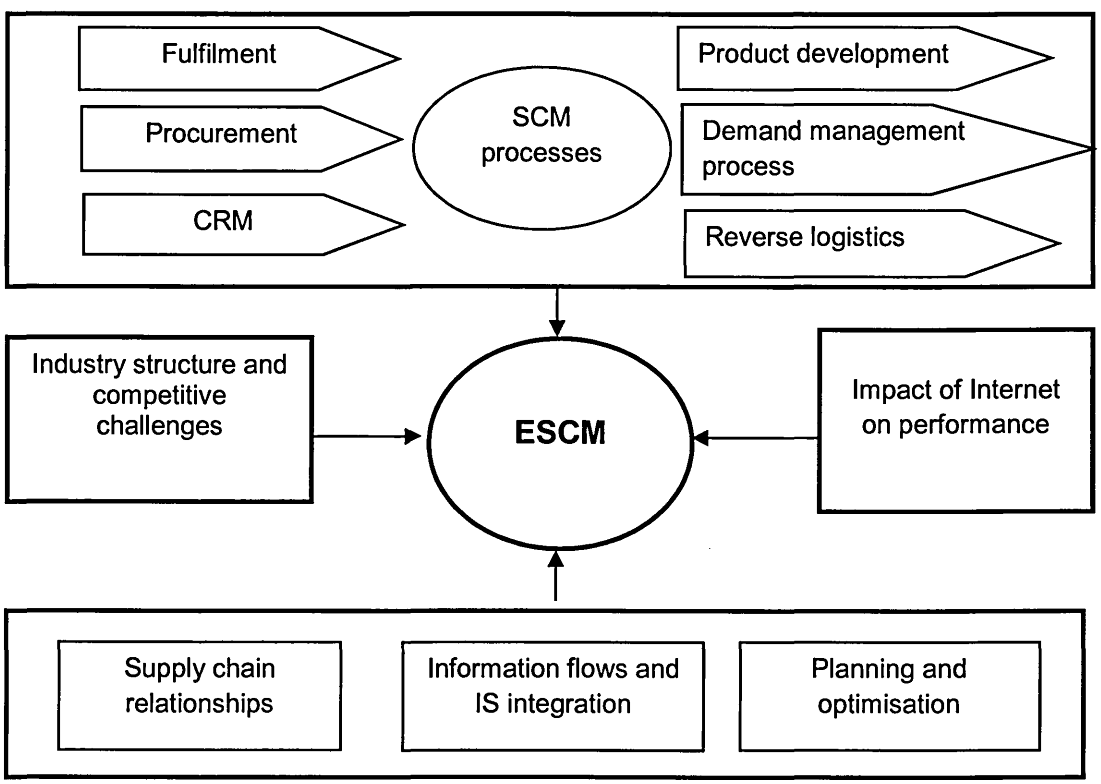
Source: Turban et al. (2012)

According to Galliers (1999), an organisation's Information System (IS) strategy has a direct impact on the operation of its supply chain processes and operations. Similarly, ICT can be used as a 'strategic weapon' to support the business strategy of companies (Venkatraman and Henderson, 1999). New information and communication technologies based on microelectronics, telecommunications, and network-oriented software have created digital networked systems. Network-oriented ICTs allow complexity and speed in SCM through the compression of time, knowledge and space. Interrelated digital networks allow companies to integrate the essential elements of the supply chain into competitive production systems. They have made supply chain integration inevitable, allowing for speed and complexity in SCM (Moodley, 2001). Proper ICT strategy provides powerful tools that allow organisations to improve supply chain performance significantly, through enhanced process efficiency and integration (Cagliano et al., 2005).

2.9.3. Impact of internet on supply chain processes

Cooper et al. (1997) investigated the concept of ESCM processes by identifying a set of processes and functions related to supply chain management: CRM; customer service management; demand management; E-fulfilment; E-procurement; manufacturing flow management; product development and commercialisation; and reverse logistics. Giménez and Lourenco (2008), in order to demonstrate impact of the internet on supply chain management, used a 'classification scheme' and developed a structure based on the idea that SCM is the management of supply chain processes. They improved the model of Cooper et al. (1997) by adding some other concepts to the model, namely: supply chain relationships; planning and optimisation tools; information flows; industry structure; competitive challenge; and impact of the internet on performance (Figure 2.9).

Figure **Error! No text of specified style in document.**.9. A framework for ESCM



Source: Giménez and Lourenco (2008)

The above framework will be discussed in depth in the following sections.

2.9.3.1. CRM and the customer service management process

CRM is a strategy used to collect information about customers' needs and purchasing behaviours in order to develop stronger relationships with customers (Deck, 2001). It is a process which allows organisations to bring together general information about customers, sales, marketing effectiveness, responsiveness and market trends (Koh and Maguire, 2004). The CRM process provides the structure for development and maintenance of relationships with customers (Croxton et al., 2001). It includes all activities related to improving business processes and identifying key customers as well as meeting demands of customers by segmenting them (Giménez and Lourenco, 2008)

A customer is an essential part of the supply chain and the philosophy behind the existence of supply chains is to satisfy customer demands as well as creating value for organisations (Chopra and Meindl, 2012). Appearance of global customers and brand related issues are the main drivers for improving customer service and customer relationship management. Jackson (2011) argues that companies need to provide new and innovative products and services to retain their customers. Stefan Olander, Nike's director of digital content, states that "*in the past the product was the end point of the consumer experience. Now it's the starting point*" (cited in Jackson, 2011, p.49).

Some of the customer relationship applications include Enterprise Resource Planning (ERP) and Available-To-Promise (ATP). ERP is an "accounting-oriented information system" for identifying and planning major business resources needed to satisfy customer orders. ERP systems enable companies to computerise order processing to analyse performance in real-time (Koh and Maguire, 2004). ATP is concerned with capability that supports the response to customer order demands. It involves sophisticated modelling and IT support. ATP is becoming a significant E-Business function considering the increased variety and complexity of product offerings (Simchi et al., 2004).

Jackson (2011) investigates how companies reinforce their relationship with their customers. He believes companies need to partner with other companies in order to generate 'unique capabilities' in their products. According to him, the fundamentals of 'owning'' customers are:

1. Acknowledging the 'burning platform' (changing their business models based on changes in business environment, and modifying their whole value chain);
2. Reinforcing the brand;
3. Finding new ways to connect to customers;
4. Looking for mass-customisation opportunities;
5. Entering into creative partnerships;
6. Paying attention to services.

The customer service management process includes providing real time information to customers through integration and enhancing communication between various parts of the supply chain such as operations and logistics. In downstream supply chain processes, the internet can assist customer service management by recognising events and listening to the customer as well as communicating the response procedure to the customer. Moreover, the internet allows for real time information sharing among different business parties, improving their business functions (Giménez and Lourenco, 2008). Croxton et al. (2001) argue that a customer service management process provides the 'firm's face' to the customers.

2.9.3.2. Fulfilment

Fulfilment is referred to as one of the main customer service processes in the supply chain. It involves physical distribution and enables companies to provide the right products and services in the right place at the right time and cost, and to the right quality (Croom, 2005). Croxton et al. (2001) argue that order fulfilment refers to the effective management of all the business operations required to deliver customer orders. According to their study, at the strategic level, there is a need for supply chain efficiency to enable a timely and precise order fulfilment. Abernathy et al. (2000) state that, the profitability of a business process depends heavily on the choice of fulfilment strategy. They believe that 'demand profile' has a significant influence on fulfilment planning.

An electronic fulfilment process refers to the integration of various business functions such as manufacturing, logistics and marketing functions, which will lead to customer satisfaction and reduced total cost. Internet technologies allow companies to enhance the efficiency of the order fulfilment process by accessing and sharing data along the supply chain. A major impact of E-Business in the field of fulfilment is improved supply control through Collaborative Planning, Forecasting and Replenishment (CPFR) (Lewis, 2001). CPFR enables different parties in a supply chain to share information as well as planning together (Giménez and Lourenco, 2008). McCarthy and Golicic (2002) argue that collaborative forecasting results in enhanced customer delivery responsiveness and product delivery assurance. Consequently, greater collaboration within a supply chain contributes to enhanced operational performance.

2.9.3.3. Demand management process

The demand management process includes balancing the requirements of customers with the capabilities of firms (Croxton et al., 2001). Giménez and Lourenco (2008) refer to the demand management process as *"forecasting demand and synchronising it with distribution, production and procurement"* (p.322). According to them, internet technologies enable smooth internal information sharing about actual sales, which, in turn, results in improved forecasts and production planning and reduced stock levels. In downstream business operations, effective exchange of information allows the customer to remove the replacement orders because of improved forecasting decisions made by the supplier.

E-Business has allowed substantial savings in costs involved with inventories, sales execution, procurement and distribution. Internet technologies, through forecasting demand more precisely, have resulted in reduced inventory costs. Improved demand forecasting and replacement of stocks through the internet is expected to result in reduction in overall inventories. Since all parties in the supply chain have access to real-time information on forecasts, sales and inventory levels, companies will be expected to keep lower inventory levels without causing the risk of 'part shortages' (Moodley, 2001).

2.9.3.4. The manufacturing flow management process

The manufacturing flow management process includes managing production through the manufacturing facilities, managing the flexibility needed in production and meeting the demands of various target markets (Croxton et al., 2001). The management of the operations involves the technical configuration of resources into the conversion processes of manufacturing products or delivering services. Materials flow management is concerned with the planning and control of physical items and of the resources utilised in support of service delivery (Croom, 2001). It allows the efficient movement of materials from suppliers to manufacturers, and to customers (Yin and Khoo, 2007). Improved management of material and product development resulting from efficient cooperation enhances final product quality and inventory turnover rates as well as reducing customer response times (Paulraj et al., 2008).

Companies can improve the production decision-making process by implementing 'internet-based production planning systems' which investigate the production requirements and plans of the various manufacturing sections. It is believed that the internet enables information sharing related to demand and supply capacity and allows for anticipating demand fluctuations and responding accordingly. Moreover, the internet allows companies to reduce their stock levels and lead times as well as reducing production cycles, due to high speed of communication. These, in turn, improve product flow management (Giménez and Lourenco, 2008).

2.9.3.5. The product development and commercialisation process

The product development and commercialisation process refers to all business operations related to developing and launching products successfully, which is essential to the success of the firm. Companies, in order to launch the right product and services, need to integrate customers and suppliers into the product development process (Giménez and Lourenco, 2008). Croxton et al. (2001) argue that the product development and commercialisation process includes following business processes:

- Defining new products;
- Establishing the cross-functional product development team;

- Designing prototypes;
- Determining the distribution channel for the new product;
- Measuring the process performance.

Internet-based product development enables a collaborative product design process among designers, manufacturers, suppliers and customers without geographical and time limitations (Cheng et al., 2000). Giménez and Lourenco (2008) contend that the internet can have internal, downstream and upstream impacts on the product development and commercialisation process by enabling cooperation among different parties, including customers, in development process of new products. Moreover, the internet can speed up the response of the company to the customer demands and enable market study in a faster and cheaper way.

2.9.3.6. The E-procurement process

A firm's relationship with its suppliers is referred to as a procurement process, which is considered to be a vital process in supply chain management (Giménez and Lourenco, 2008). It involves the identification, specification, co-ordination and determination of an organisation's resource needs. E-procurement is considered to be a critical strategic issue in SCM. It influences the structure of supply chains through supply base reduction and the connection of all suppliers electronically. Furthermore, E-procurement adoption results in increased procurement capability through providing more visibility for procurement processes as well as improving information management for purchase decision making. In general, reduced transaction costs and improved information management are the main benefits of E-procurement, which, in turn, result in total supply chain cost improvements (Croom, 2001).

The E-procurement process is concerned with accomplishing procurement and sourcing operations via the internet as well as creating efficient relationships between buyers and suppliers. According to Giménez and Lourenco (2008), there are two types of E-procurement: 'Marketplaces' and 'B2B E-procurement'. B2B E-procurement is a 'one to one relationship' between a buyer and a supplier. And, 'Marketplaces' bring multiple buyers and sellers together in a 'virtual market'.

E-procurement allows companies to reduce costs by making this process more efficient. Information sharing is considered to be the main impact of the internet on the procurement process since E-procurement requires a large amount of sharing and transferring of data. However, companies can apply knowledge sharing systems such as analytical models to efficiently analyse data and enhance decision making processes (Swaminathan and Tayur, 2003).

Companies apply E-Business processes such as E-procurement to reduce transaction costs, improve business processes, have access to a wider range of suppliers and analyse different procurement models (Bartezzaghi and Ronchi, 2003; Presutti, 2003). Four main benefits of E-procurement for organisations, based on the findings of research of Croom (2001), are argued to be financial benefits, improved information flow, internal and external communication and planning.

2.9.3.7. The reverse logistics and returns process

Effective management of a reverse logistics and returns process is essential in today's business, considering its impact on competitiveness of companies (Rogers and Tibben-Lemke, 1999). A reverse logistics and returns process includes decisions on return avoidance practices, disposition guidelines, development of a returns network and flow options (Croxton et al., 2001). The impact of the internet on returns of E-commerce sales is another impact. In other words, compared to traditional transactions, the volume of returns in E-commerce is higher and also the logistics involved are different. Dealing with these returns efficiently is an important issue for companies involved in E-Business. The internet can have a significant impact on the reverse logistics and returns process by providing enhanced knowledge and data to all parties of the supply chain involved in this process (Giménez and Lourenco, 2008).

2.10. ESCM in SMEs

Many SMEs are now moving to the E-Business era and use E-Business technologies in their business operations and production processes. They are realizing the significance of integration of business functions and systems such as supply chain management and customer relationship management with ERP systems in order to create competitive edge in their E-Business. SMEs have started to pay attention to creating long term and close relationships with their customers and suppliers as well as involving them in the development and production of new products (Koh and Maguire, 2004).

The study of Maguire et al. (2007) demonstrated that spreadsheets and databases as well as intranets and the internet continue to be considered as the main applications in creating competitive advantage in SMEs. Innovative use of the internet allows SMEs to take advantage of market opportunities (Maguire et al., 2007). Internet technologies have enabled SMEs to have access to a wider choice of trading partners (Ibrahim, 2003). Wade et al. (2004) investigated the impact of E-Business on SME performance. Based on their studies, business value is created and improved significantly by the adoption of internet and E-Business solutions.

Most managers in SMEs usually recognise the potential growth benefits of the implementation of E- business in the supply chain (Wagner et al., 2003). Chen et al. (cited in Çalipinar, 2007) consider some of the benefits of integration through supply chains for SMEs including: standardization of production process; simplification of supply chain process; automation of processes; recovery in purchase/payment/distribution processes; cost reductions; development in global competition. Considering the benefits created by E-Business practices, companies realise the imperative of automating and integrating their supply chains thought electronic networks. It is argued that although many SMEs are aware of the benefits of the adoption of E-Business in the supply chain, they are still hesitant to implement E-Business (Alam and Ahsan, 2007).

Despite the fact that internet technologies such as E-Business has improved business processes in terms of developing electronic markets and electronic data exchange (Whiteley, 2000), some SMEs still do not employ this new technology in performing their business activities (Peet et al., 2002).

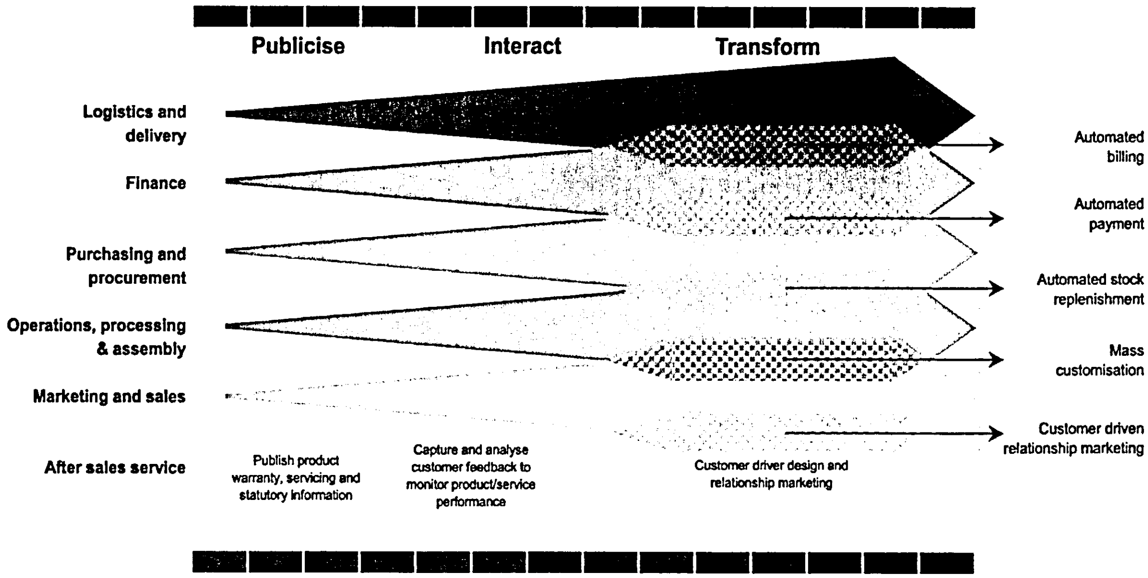
According to Lincoln and Warburg (1987), small businesses mainly use ICT for basic accounting and word processing. Poutsma and Walravens (1989) argue that small firms use their computers as "*tools rather than communications* *media*" (cited in Maguire et al., 2007, p.41). It is argued that small firms either do not adopt the internet at all or just use it for the procurement process, while large firms are more likely to adopt the internet in all three main processes of E-commerce, E-procurement and E-operations (Cagliano et al., 2005). Most SMEs consider E-Business to involve email and setting up Web sites (Taylor and Murphy, 2004). The study by Wagner et al. (2003) investigated the level of E-Business and E-supply chain implementation in SMEs. Based on their study, implementation of E-Business technologies in SMEs rarely goes further than email and web pages and they still conduct their business using traditional communication methods, in spite of having EDI for real time information exchange between the customer and the supplier (Wagner et al., 2003).

SMEs can take advantage of ICT by developing intranets and linking into extranets, to build strategic alliances with other organisations (Maguire and Magrys, 2001). Maguire et al. (2007) investigated the use of ICT in SMEs in the context of gaining competitive advantage, discussing the extent to which E-Business and knowledge management approaches are being used by SMEs. According to them, ICT allows for cost reduction and improvements in product development and service quality in SMEs, resulting in gaining competitive advantage. It is argued that sales forecasting, customer analysis and pricing are the most effective ways of using ICT in SMEs, which results in gaining competitive advantage; *"in today's business environment the effective use of IS and IT can provide small firms with the opportunity to take advantage of ICT*" (Maguire et al., 2007, p.37).

Chong and Ooi (2008) argue that SMEs need to make huge investments and share information efficiently in order to adopt E-Business practices in their business processes. Additionally, they need to develop long-term relationships with their trading partners. Taylor and Murphy (2004) argue that, in order for SMEs to engage in sustainable economic growth in the knowledge economy, they need to apply the internet and brochure Web pages in their business operations, establish transaction Web sites and change their business operations by integrating their Web sites and supply chain processes.

Foley and Ram (2002) investigated patterns of acceptance of E-Business technologies in the supply chain of SMEs by providing a PITs model (Publishing, Interacting, Transforming) which considers the adoption of ICT and E-Business technologies amongst SMEs (Figure 2.10). This model is based on the functions and activities for which ICT can be used in the firm. In other words, the internet and ICT are used by SMEs to publicise and broadcast information on a Web site, interact with customers and suppliers through electronic inter-related networks, and transform their business conduct (Taylor and Murphy, 2004).

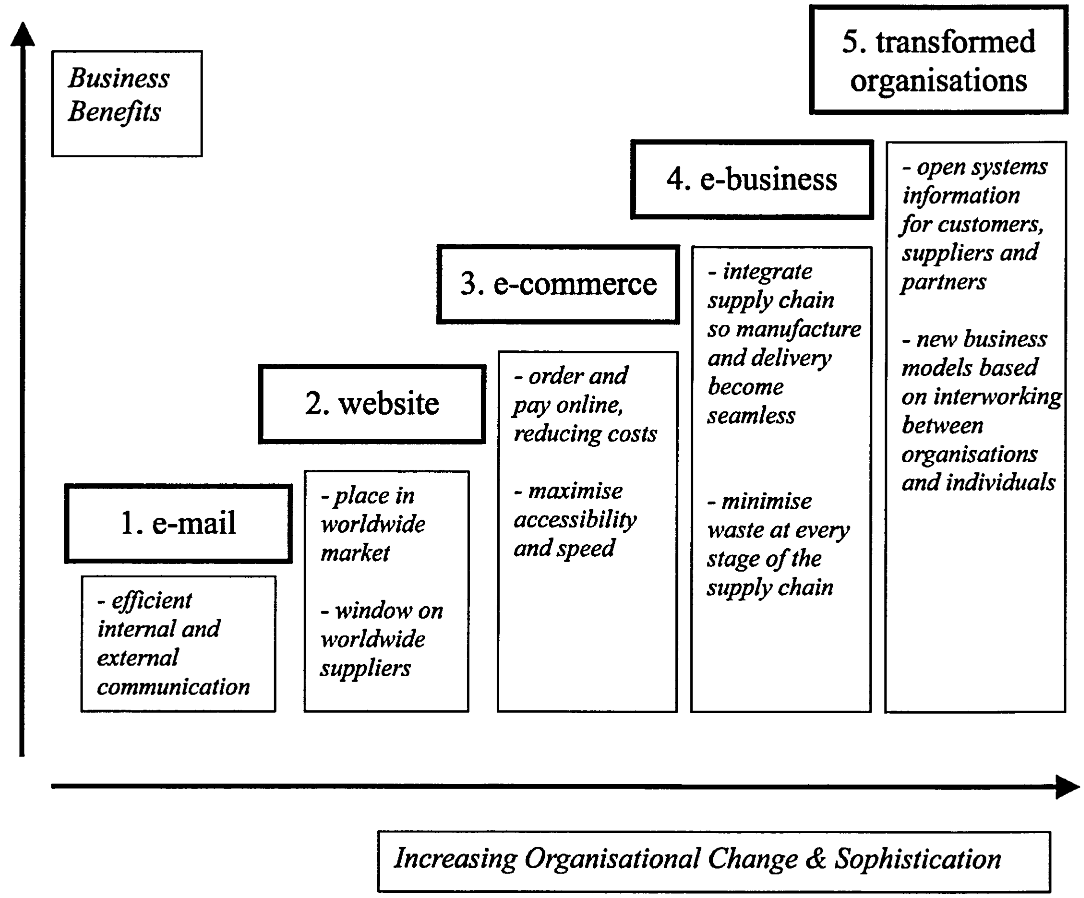
Figure **Error! No text of specified style in document.**.10. The PITs model of ICT adoption by SMEs



Source: Foley and Ram (2002)

Firms that have newly adopted the internet start from single areas such as E-commerce and E-procurement, and move towards other E-Business adoption strategies (Cagliano et al., 2005). Similarly, Taylor and Murphy (2004) argue that information technology adoption in SMEs is considered to be progressive. "*The sequence begins with the use of e-mail and progresses through Web site development to the buying, selling and payment mechanisms of E-commerce, to the SCM of E-Business and the new business models built on full immersion in the technology*" (Taylor and Murphy, 2004, p.283). The 'adoption ladder' emphasises the 'transformational' aspects of technology as well as key 'social processes' facilitating development of information technologies (Scarborough and Corbett, 1992). This suggests that SMEs can follow a set of prescribed and progressive steps (Taylor and Murphy, 2004). This adoption ladder, which is supported by the UK government's Department of Trade and Industry (DTI, 2001) is illustrated in Figure 2.11.

Figure **Error! No text of specified style in document.**.11. The DTI adoption ladder



Source: Taylor and Murphy (2004)

Progressive E-Business adoption can be used in a number of areas of business operation in SMEs including: logistics and delivery; finance; procurement and purchasing; operations, processing and assembly; marketing, sales and after-sales service; and human resource management (Foley and Ram, 2002).

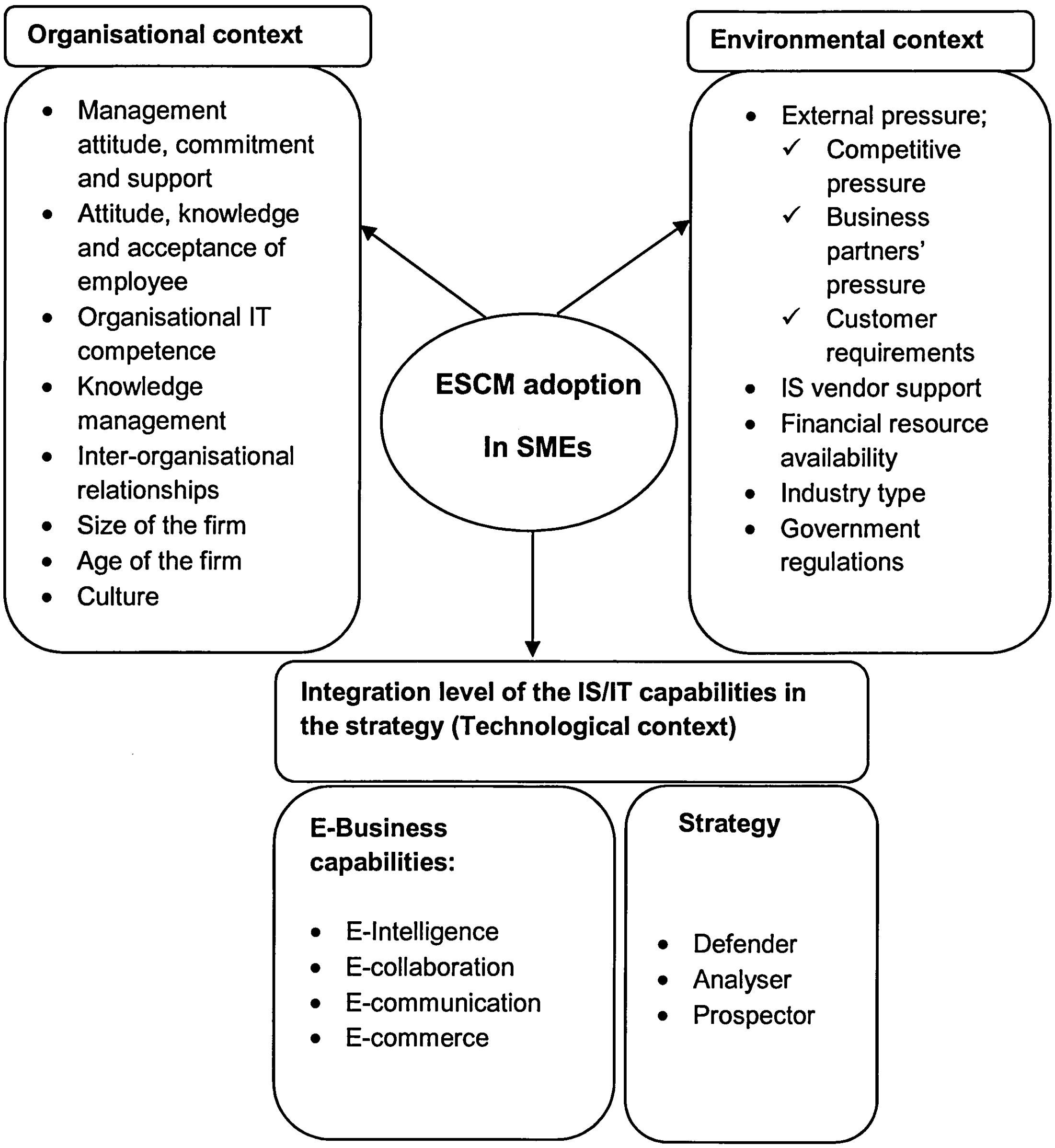
The different nature of SMEs, and the way SMEs recognise and develop business opportunities need to be considered when assessing the adoption of ICT and E-Business technologies in SMEs (Taylor and Murphy, 2004). IT adoption in SMEs differs from that in larger companies, as SMEs usually face the problems of lack of financial resources, lack of expertise and skilled employees, and they often have a rigid production plan which focuses mainly at the cost of strategic planning (Huin, 2004; Lee et al., 2005; Forsman, 2008; Andersson and Tell, 2009). Given their resource limitations compared to larger organisations, SMEs incur higher costs and risks in adopting E-Business practices such as IT. Moreover, challenges facing large firms and SMEs differ significantly, so, the adoption of IT is quite different in their organisational structure (Barua et al., 2001). Information systems successfully adopted by large companies may not be appropriate for SMEs (Premkumar, 2003). Wagner et al. (2003) argue that globalisation, technology, E-Business barriers and competency-based issues influence the development of E-supply chain in SMEs.

Haug et al. (2011) carried out research on IT adoption in SMEs by identifying the main factors that define the readiness for adopting IT in SMEs. They suggested a framework for identifying IT readiness in SMEs. They classified IT readiness factors under three categories: characteristics of company; management; and employees. Furthermore, they recognised six dimensions: pressure to change existing processes; room for risks; IT acquaintance; IT project support; IT skills; and IT project motivation. These dimensions provide a solid basis for evaluating IT-readiness in companies. Moreover, Haug et al. (2011) assorted the IT adoption factors in existing literature under eight categories;

1. Suppliers, customers, competitors, government, IT product vendors, and IT consultants;
2. External pressures;
3. Having access to resources;
4. Perceived benefits and costs;
5. Owner/manager's and employers' knowledge, attitude and support;
6. Individual characteristics/ cultural factors;
7. Level of technological education and knowledge management.

The acceptance of IEBT by SMEs is often viewed from the point of view of innovation (Ifinedo, 2011). Therefore, a combination of the TOE model and the Diffusion of Innovation theory, which investigates the adoption of new technologies based on the adoption of innovation, will be discussed in adopting E-supply chain processes in SMEs. The proposed framework is illustrated in Figure 2.12.

Figure **Error! No text of specified style in document.**.12. Research proposed model on the ESCM in SMEs



This Figure will be explained in detail in the following section.

2.10.1. Organisational context

Organisational factors are discussed in the following section.

- Management attitude, commitment and support

Cragg and King (1993) investigated the evolution of IT in small businesses. They found out that positive attitude of the owners of companies about IT is the main motivating factor for IT projects. According to Raymond and Bergeron

(1996), organisational support is vital for SMEs in order for them to take advantage of E-Business technologies. Similarly, De Guinea et al. (2005) indicated that managerial support is essential for IS effectiveness of information systems in SMEs.

- Attitude, knowledge and acceptance of employee

IT skills (in terms of software technical skills) of employees and their perspective about IT acquaintance have a positive impact on IT adoption in SMEs (Lanz, 2002). Moreover, employees' motivation and justification of the advantages of IT and their confidence in using IT (Davis, 1989) is noted to significantly influence the acceptance of IT. Love et al. (2001) argue that companies can improve the attitude towards employment of IT systems by training their employees (Kuan and Chau, 2001).

- Organisational IT competence

Organisational IT competence refers to the level of organisational knowledge about technological innovations, which, in turn, is argued to influence IT adoption (Raymond, 2001; Zhu et al., 2006). SMEs need to acquire a reasonable level of IT knowledge and be aware of the benefits of such innovations in order to accept these innovations in their business processes (Caldeira and Ward, 2002; Pflughoeft et al., 2003). It has been argued that using IT in business processes requires a broad range of skills including "*knowledge of the medium, the vision to predict its influence in future E-Business strategies, and the ability to translate the vision into actual proactive business practice, as well as having some technological awareness of how internet technology operates through to being able to control future business growth using existing technologies*" (Wagner et al. 2003, p.345).

- Knowledge management

In order for SMEs to employ electronic applications in their supply chain processes, they need to obtain basic ICT knowledge and technology to operate simple E-solutions such as e-mail and brochure Web sites. Moreover, SMEs need to have good levels of knowledge, and skills around advanced technology, such as IT, strategic management and marketing (Local Futures Group, cited in Dixon et al., 2002).

Knowledge management is a relatively new topic for SMEs, with less than 10 percent of these enterprises using knowledge management. Many SMEs are reluctant to consider knowledge management as part of their future business plans (Fletcher and Harris, 2002). Koh and Maguire (2004) and Maguire et al. (2007) argue that SMEs need support in knowledge management in terms of education and training, and developing new techniques in order to gain competitive advantage.

The IT knowledge of managers is of key importance, considering the fact that most strategic decisions are made by managers (Haug et al., 2011). Haug et al. (2011) argue that if management have a reasonable level of knowledge, then IT will be probably part of the strategy.

The level of skills and competencies within a firm influences the level of connectivity in companies (Wagner et al., 2003). A lack of technical and business skills makes the adoption of E-Business technologies and knowledge management largely impracticable in SMEs (Maguire et al., 2007).

SMEs need to have access to accurate information in order to make operational, tactical, and strategic decisions, which highlight the connection between information and knowledge (Maguire et al., 2007). In order for SMEs to reduce the level of complexity in acquiring and managing different kinds of knowledge (explicit, tactic and cultural knowledge) and to create useful knowledge, they need to integrate their E-Business systems (such as ERP, SCM, CRM) by creating interrelated networks. Team building, which persuades sharing knowledge among employees, and the use of mobile technology, which enables real-time B2B and B2C operations, support creating tactic knowledge. Moreover, understanding of human behaviour and motivation allow efficient cultural knowledge creation (Koh and Maguire, 2004).

- Inter-organisational relationship

The study of Chong et al. (2009) indicated that inter-organisational relationship factors (trust, communication, collaboration, information sharing and trading partner's power) affect E-Business supply chain technology adoption in SMEs. According to the results of their study, communication, collaboration, and information sharing all significantly affect the adoption of E-Business in SMEs.

While, trust and trading partner's power have less impact on E-Business adoption.

- Firm size

It has been argued that firm size positively influences the adoption of IS in organisations (Al-Qirim, 2007; Teo, 2007; Huang et al., 2008; Li et al. 2010). Organisational size is of significance in development of E-Business and performance improvement of manufacturing SMEs (Sadowski et al., 2002; Yang et al., 2005). However, in contrast, other researchers such as Goode and Stevens (2000) and Gibbs and Kraemer (2004) have not been able to support this relationship.

- Firm age

The age or organisational lifecycle of a firm is considered to influence organisational performance as younger firms face high information costs and financial limitations (Hartarska and Gonzalez-Vega, 2006). This, in turn, influences companies' investment capabilities in E-Business (Chan and Lin, 2007). Firm age is considered to be significantly associated with successful application of internet technologies (Lai, 1994). Simpson and Doherty (2004) contend that the older an SME is, the more reluctant it will be to use E-Business technologies. However, researchers such as Chatterjee et al. (2002) and Li et al. (2010) consider firm age to have a minor impact on the adoption of IEBT.

- Culture

Organisational culture has a significant influence on 'managerial processes' and can influence decisions regarding investments in IT projects (Leidner and Kayworth, 2006). Macro factors, such as the speed of rapid growth at which SMEs would be required to change (in terms of production, skills and technological infrastructure) and the tension experienced by owners/managers are identified as key factors. These factors influence the lifestyle of managers, products and culture of the company (Wagner et al., 2003).

2.10.2. Environmental context

Taylor and Murphy (2004) argue that environmental factors affect the adoption of ICT in SMEs. Corso et al. (2001) contend that SMEs conducting their business at a high level of environmental complexity usually tend to adopt new technologies in order to support technological integration with their customers, whereas, in a high level of product complexity, SMEs tend to adopt more traditional product development tools.

Environmental factors are discussed in the following section.

- Industry

It has been argued that organisations conducting their business in a highly competitive environment will be more responsive and reflective to environmental changes; by adopting appropriate IT innovations (Hadaya, 2006; Al-Qirim, 2007). However, in the context of SMEs, this issue can be different (Drew, 2003). In the environmental context, type of industry has a considerable impact upon the performance and strategic behaviour of SMEs (Mauri and Michaels, 1998) and their E-Business capabilities (Piscitello and Sgobbi, 2004; Coltman et al., 2007). Similarly, several scholars argue that, the industry type or sector in which an organisation conducts its business may influence the adoption of IS innovations (Drew, 2003; Levenburg et al., 2006; Jeyaraj et al., 2006; Li et al. 2010); however, other researchers such as Chatterjee et al. (2002) and Teo (2007) did not confirm this relationship. Wagner et al. (2003) argue that SMEs in high technology industries tend to be more involved in E-Business than firms in a lower technology base.

- External pressure

External pressure from customers, partners, and competitors has a significant impact on the adoption of IEBT in SMEs (Ifinedo, 2011). Most SMEs adopt new innovations only when their clients require them to do so (Kula and Tatoglu, 2003). So, if a business partner uses a special kind of IS innovation, the other partners need to accept and adopt the required innovation (Hadaya, 2006). Furthermore, large customers can impose strategic behaviour upon SMEs (Freel, 2000). Customers and suppliers and government regulations may require particular information and data formats, pressurising the focal company to adopt a certain kind of IT (Haug et al., 2011). Trading partners who have improved their Inter Organisational Relationship (IOR) by creating better communication and collaboration as well as effective information sharing are more likely to adopt E-Business in their processes, which, in turn, influence the adoption of E-Business among SMEs (Chong et al., 2009).

SMEs need to apply ERP systems in order to provide an improved and competitive customer services. In other words, business competitiveness is largely dependent on the role of ERP systems in an enterprise. SMEs need to focus on developing mid-range ERP systems, which are cheaper, simpler, and are designed to suit the business processes in SMEs (Koh and Maguire, 2004). Moreover, it is argued that Electronic Data Interchange (EDI) allows SMEs to connect with customers and suppliers (Maguire et al., 2007).

- Financial resources

Some researchers, such as Tan and Wu (2003), Lawson et al. (2003), and Grandon and Pearson (2004) argue that financial resources are of significance to the adoption of IS in SMEs. Lack of financial resources in SMEs, for example, requires companies to consider the risks of failure before making any decision regarding IT implementation (Love et al., 2001). In addition, it is argued that companies that have financial problems are not able to employ adequate external expertise (Cragg and King, 1993).

- External IS vendors

SMEs usually depend on external services and expertise such as IT consultants and vendors for implementing information systems, while large companies have more internal experts (Premkumar, 2003). Hovav et al. (2004) argue that external consultants and vendors may put pressure on companies by requesting them to invest in certain IT projects.

It is believed that local enterprise agencies can provide general support for SMEs, but they usually lack an understanding of SMEs' E-Business requirements. In other words, they can support SMEs in setting up a Web site but do not go beyond that. So, SMEs have to deal with more complex operations both internally with employees and externally with customers and suppliers. Therefore SMEs will have no choice but to involve consultants on a longer term basis to help their business processes (Wagner et al., 2003).

2.10.3. Technological context (Integration level of the IS/IT capabilities in the strategy)

The strategy selected in relation to IT implementation (proactive, reactive, technology leader/follower, etc.) has a significant influence on IT adoption

(Lewis and Cockrill, 2002; Teo and Pian, 2003). Although some SMEs have created basic internet technologies such as Web sites, they need to integrate the technology into their business processes. In other words, they need to run the Web site along with their marketing and supply chain strategies (Wagner et al., 2003).

Raymond and Bergeron (2008) argue that high alignment of E-Business capabilities with the business strategy of SMEs contributes to improved organisational performance by influencing growth, productivity and profitability. Based on their study for defender SMEs, greater alignment of their E-Business activities leads to greater growth and profitability. For analyser SMEs, this alignment is associated with growth and profitability. While for prospector SMEs, the alignment of their E-Business activities is associated only with productivity. Internet technologies and applications allow manufacturing SMEs to create a high level of alignment between E-Business capabilities and business strategy by targeting competitive needs and strategic priorities, and this, consequently, results in performance improvements (Raymond and Bergeron, 2008).

SMEs need to have access to accurate information to make appropriate decisions on operational, tactical, and strategic business processes (Koh and Maguire, 2004). They need to be flexible and adapt easily to changes in the environment. They should have competitive operational and technological strategies which allow development of various E-Business capabilities in order to improve their competitive position. It is argued that investments in E-Business alone do not lead to performance improvement in SMEs. SMEs need to improve their capability of technology management as well as receiving support from researchers and knowledge transfer agents (Raymond and Bergeron, 2008).

In order for SMEs to use E-Business technologies and knowledge management to create competitive advantage, it is **essential for them** to be flexible, prompt and responsive to the change and uncertainty in their business environment (Koh and Saad, 2002). In general, SMEs need to develop flexible supply chain processes and strategies in order to meet the requirements of different market segments, and apply business systems that adapt to current and future market requirements.

2.11. Critical success factors for E-supply chain adoption in SMEs

The study of Chwelos et al. (2001) indicates that factors such as perceived benefits, organisational readiness, and external pressure play a significant role in Inter Organisational System (IOS) acceptance and the successful adoption of E-Business technologies in SMEs. Moreover, technology leaders who persuade and support the technological change play a significant role in successful implementation of IT in companies (Sharma and Rai, 2003; Pitt et al., 2006). It is argued that management support is crucial to the successful adoption of IT, considering managers' role in allocating resources to IT projects (Lanz, 2002).

Furthermore, SMEs need to rely on external sources of support such as IS vendors in order to successfully implement IEBT in their business processes (Poon and Swatman, 1999; Al-Qirim, 2007). McDonagh and Prothero (2000, cited in Ifinedo, 2011) contend that the support from IS vendors allows SMEs to add value to their business planning, and cover knowledge gaps related to the adoption of IS innovation.

It is believed that in order for SMEs to be successful, they need to initiate a competitive advantage which differentiates them in a dynamic and constantly changing business environment (Koh and Maguire, 2004). Feindt et al. (2002) classified critical success factors for rapid growth of SMEs engaged in E-commerce into three broad areas: factors relevant to all companies involved in E-commerce, factors relevant to all companies in a particular industry sector and factors relevant to individual companies:

1. Factors relevant to all companies involved in E-commerce:
    - Content: presenting products and services through the internet
    - Convenience: launching practical and appropriate Web sites for business purposes
    - Control: defining business processes that need to be controlled
    - Interaction: establishing effective customer relationship

2. Factors relevant to all companies in a particular industry sector:

- Community: creating effective information sharing with other partners in the supply chain
- Price sensitivity: being sensitive to internet price competition

3. Factors relevant to individual companies:
    - Brand image: applying 'online and offline branding techniques'
    - Commitment: encouraging the use of the internet and continuous innovation
    - Partnership: using partnerships to force internet presence and business development
    - Process improvement: enhancing and automating business processes
    - Integration: improving cooperation and enhancing business processes through inter-related IT systems (Feindt et al., 2002).

Success in SMEs is based on a strong and supportive working relationship between the customer and the supplier. Therefore, network relationships are of significance for SMEs (Wagner et al., 2003). SMEs, in order to be able to implement electronic supply chain practices successfully, need to effectively share essential supply chain information within their supply chain and with their trading partners (Chong et al., 2009). Moreover, managers and employees knowledge and attitude towards adoption and implementation of E-Business technologies are important issues (Caldeira and Ward, 2002).

It is argued that many factors that assist successful adoption of E-Business technologies in SMEs relate to internal factors rather than the external conditions of the firm. These internal factors include:

- Motivation, experience and skill of the owner of the firm;
- Knowledge about managing organisational growth;
- Access to financial, technological and human resources;
- Focus on flexibility and innovation as competitive advantage;
- Effective communication and relationship with customers;
- Focus on turnover rather than sales;
- Constant demand and operating in a developing market (Feindt et al., 2002).

2.12. Barriers of adoption ESCM in SMEs

Maguire et al. (2007) argue that a lack of technical skills and IT literacy as well as trained employees is main obstacle to the adoption of E-Business technologies. Similarly, according to some researchers, poor knowledge about information technology and information systems is one of the main problems preventing SMEs from the adoption of information and communication technologies (Simpson and Doherty, 2004; Martin and Milway, 2007). Based on the study of Scupola (2003) and Love et al. (2001), the availability of financial resources and the possibility of investment in expensive IT projects can be considered as key issues for SMEs in terms of implementation of internet and E-Business technologies. Therefore, SMEs are argued to need to receive financial support to assist implementation of IEBT (Lawson et al., 2003; Grandon and Pearson, 2004). In contrast, Simpson and Doherty (2004) contend that lack of financial resources will not considerably influence IEBT adoption in SMEs.

In addition, lack of managerial time to explore IT technologies available to the company, and lack of skilled labour are significant barriers to the initiation of IT projects in SMEs (Cragg and King, 1993; Maguire et al., 2007). Similarly, Wagner et al. (2003) argue that a lack of time and financial resources for enhancing the IT skills of staff, and a lack of internal competencies as well as resistance to change hinder adoption and implementation of E-Business technologies. Especially for SMEs, the integration of various cultures and systems within the organisation are the main barriers to the use of E-Business technologies (Croom, 2001). Furthermore, Drew (2003) and Love et al. (2001) believe that fear of job loss and reluctance to change work routines among employees make employees unwilling to change.

According to a study conducted by Wagner et al. (2003), negative attitudes towards E-Business which prevents successful adoption of E-Business in supply chain processes include:

- Managerial time to be invested in change management;
- Anxiety about being able to cope with increased business;
- Lack of E-Business skills and competencies;

- Founding, which is not particularly related to technology;
- Government policy and in particular lending institutions;
- Concern for security and fraud.

Uncertainties regarding the impact of E-Business on marketing and supply strategies hinder E-Business adoption and implementation in SMEs (Wagner et al., 2003). Attewell (1992) argues that organisations are likely to delay adopting new technologies due to a lack of knowledge and required skills. Also, lack of external technical support is a significant barrier to the adoption of E-Business technologies in SMEs (Scupola, 2003; Simpson and Doherty, 2004). Furthermore, according to Wagner et al. (2003), one of the implications of non-adoption of E-Business for SMEs is that there are little real performance benefits in the early stages of adoption for SMEs. It is argued that one of the reasons behind the failure of IT projects in SMEs could be the lack of awareness of the 'IT readiness'. SMEs need to consider "*the strategic importance of IT projects as well as the company's IT readiness*" when adopting IT (Haug et al., 2011, p.505). An IT-readiness framework suggested by Haug et al. (2011) allows SMEs to be more confident in adopting and implementing appropriate IT projects, increasing the success rate of IT projects in SMEs.

APO (2002) identifies the following barriers facing SMEs while adopting ESCM in their performance:

- Low awareness of good SCM practices among SMEs;
- Slow implementation of SCM by SMEs;
- Limited and localised SCM among SMEs;
- Lack of information sharing among and between SMEs vendors and customers;
- Low level of IT usage for SCM by SMEs;
- Demanding more government support for SCM development by SMEs.

Çalipinar (2007) highlights other problems experienced by SMEs when implementing SCM. These include: lack of supplier management skills; high level of competition in the supply chain; lack of cooperation in the supply chain; lack of customer management knowledge; distance from customers/suppliers;

and the need for investments on information technologies by partners. He suggests that although SCM may limit the advantages that SMEs could gain, it provides them with more opportunities for managing and controlling the possible risks.

In general, there are at least seven forms of barrier for SMEs adopting E-Business in their supply chains (Dixon et al., 2002, Buckley and Montes, 2002);

1. Being unaware of the potential of ICT in improving SMEs business operations, and not being informed about the applicable ICTs to the products and services offered by SMEs;
2. Conducting business in small and defined niche markets, which does not require connectivity through the Internet;
3. Security and privacy issues associated with the use of the Internet, especially in relation to making online payments;
4. The Lack of necessary IT skill and knowledge to engage with the digital economy;
5. The lack of personnel to implement ICT, and difficulty or high costs of hiring expertise to pursue ICT strategy;
6. High initial operation costs and continuing costs of ICT and E-Business as well as difficulty to outsource IT activities;
7. Inability to develop ICT establishment because of high costs of research in the area of IT.

Smyth and Ibbotson (cited in Wagner et al., 2003) identified a number of barriers to successful E-Business implementation and growth, including development of proper skills, investment in education, training and knowledge of internet based technologies.

2.13. Research proposition

Based on the literature review and research conducted in the area of electronic supply chain management, and the main goal of this research which aims to discover factors influencing successful adoption of electronic supply chain practice, the following research propositions/hypotheses are developed and suggested to be examined:

Null Hypothesis 1: *There is no association between adoption of electronic supply chain management and integration of supply chain.*

Null hypothesis 2: *There is no association between integration of supply chain (resulted from adoption of E-Business) and improvement of supply chain processes.*

Null hypothesis 3: *There is no association between barriers of E-Business adoption and successful implementation of electronic supply chain management.*

Null hypothesis 4: *There is no association between perceived benefits of adoption of E-Business technologies and successful adoption of electronic supply chain management.*

Null hypothesis 5: *There is no association between consideration and importance of environmental factors and successful implementation of electronic supply chain management.*

Null hypothesis 6: *There is no association between consideration and importance of organisational factors and successful implementation of electronic supply chain management.*

2.14. Conclusion

IT plays a significant role in creating close relationships between buyers and suppliers and improving the collaboration process (Subramani, 2004). Information technologies such as E-Business allow companies to enhance information sharing in their supply chain (Chou et al., 2004). IT can have a significant impact on SCM as well as improving the competitiveness of firms. ESCM, through the use of information technologies, will enable companies to improve customer relationships, efficiently integrate internal business processes and collaborate in real time with different parties in the supply chain (Giménez and Lourenco, 2008). Chan and Ngai (2007) argue that relative advantages, costs, organisational factors, technological factors, top management support, external pressures, and individual characteristics are main factors influencing IT adoption in companies. According to them, compatibility of the IT with organisational culture and infrastructure and top management support are the most significant factors affecting internet adoption.

E-Business has a significant impact on supply chain structures, coordination and relationships (Giannakis and Croom, 2004). E-Business applications lead to enhanced integration and collaboration across E-supply chains (Cagliano et al., 2003; McIvor and Humphreys, 2004). Much of the benefits of E-Business come from the new possibilities of up-to-date communication and information sharing offered by the internet. Taylor and Murphy (2004) refer to the unique qualities of the internet as ubiquity, interactivity, speed and intelligence, which provide new ways of managing value chains, and offer new marketplaces for organisations (Kenney and Curry, 2001). It is argued that customer satisfaction is key benefit of E-Business, since customers have access to internet to easily browse order and configure products, view delivery and shipment schedule and receive copies of invoices through the internet (Moodley, 2001).

ESCM system can improve SCM by allowing effective communication between companies in the supply chain as well as providing easy access to information generated. Shahidan and Netadj (2008) argue that the introduction of an E-supply chain model will fill the communication gap between the different parties in the supply chain, and allow the supply chain network to act as a single entity. This, in turn, will allow companies to sustain their competitiveness within the fast changing environment. Furthermore, reducing the problem of information overload is considered to be another advantage of E-supply chains (Leon-Pena 2008).

E-Business value is co-created in supply chains through the interaction of the supply chain partners' E-Business systems. In other words, improved operational performance happens through combining and integrating a firm's E-Business systems with its supplier E-Business systems (Melville et al., 2004; Kohli and Grover, 2008; Wiengarten et al., 2011). IOR relationships have a significant influence on the adoption of Inter Organisational System (IOS) such as EDI, and E-Business (Shang et al. 2005; Huang et al. 2008). Critical factors of execution and demand fulfilment, collaboration, flexibility and speed are essential components of E-Business (Damanpour, 2001).

Many SMEs are now moving to the E-Business era and use E-Business technologies in their business operations and production processes. They are becoming aware of the importance of integrating SCM and CRM with ERP systems in order to create competitive edge in their E-Business. Taylor and Murphy (2004) argue that SMEs, in order to engage in sustainable economic growth in the knowledge economy, need to: apply the internet and brochure Web pages in their business operations; establish transaction Web sites and change their business organisation and operations by integrating their Web sites and supply chain processes. According to Raymond and Bergeron (2008), SMEs need to align their business and E-Business strategies in order to be less vulnerable to changes in their business environment. Business strategy needs to be defined considering the supply chain processes supported by E-Business as well as the related use of information sharing and system coupling mechanisms with both customers and suppliers (Cagliano et al., 2005). SMEs are different from larger companies in the context of IT adoptions (Thong et al., 1996; Lee et al., 2005). Given their resource limitations compared to larger organisations, they incur higher costs and risks adopting E-Business practices such as IT. Moreover, challenges facing large firms and SMEs differ significantly, so, the adoption of information systems is quite different in their organisational structure (Barua et al., 2001; Thong et al., 1996). Wagner et al. (2003) argue that globalisation, technology, E-Business barriers and competency-based issues influence the development of E-supply chain in SMEs. The different nature of SMEs, and the way SMEs recognise and develop business opportunities need to be considered when assessing the adoption of ICT and E-Business technologies in SMEs (Taylor and Murphy, 2004).

Success in SMEs is based on a strong and supportive working relationship between the customer and supplier. Therefore, network relationships are of huge significance for SMEs (Wagner et al., 2003). SMEs need to effectively share information in order to implement E-Business successfully in their supply chain. In other words, SMEs that are willing to share essential supply chain information with their trading partners are more likely to adopt E-Business (Chong et al., 2009). For SMEs to successfully adopt IEBT, their managers and staff need to have a reasonable level of understanding of the application of IS in their business operations (Caldeira and Ward, 2002).

It is argued that technology leaders who persuade and support the technological change play a significant role in successful implementation of IT in companies (Sharma and Rai, 2003; Pitt et al., 2006). Therefore, management support is crucial to the successful adoption of IT, considering managers' role in allocating resources to IT projects (Lanz, 2002). Last but not least, SMEs need to be flexible and adapt easily to changes in the environment. They should have competitive operational and technological strategies which allow development of various E-Business capabilities in order to improve their competitive position. Investments in E-Business alone do not lead to performance improvement in SMEs, especially if they are not coherent with the environment and strategic objectives. SMEs need to improve their capability of technology management, and receive support from researchers and knowledge transfer agents (Raymond and Bergeron, 2008).

Chapter 3. **Methodology**

3.1. Introduction

Business research refers to "*the application of the scientific method in searching for the truth about business phenomena*" (Zikmund et al., 2013, p.5). In the scientific method, researchers use knowledge and evidence to reach objective conclusions about the real world, which enables understanding of business phenomena. It includes the development of theory, defining a problem, data collection and analysis, as well as communicating the findings and their implications (Zikmund et al., 2013). Business and management research needs to be both theoretically and methodologically accurate, as well as being practical in the world of business (Hodgkinson et al., 2001).

Diversity of modes of engagement in management research has created considerable problems with regard to evaluation of its research claims. The researcher's role in the process of data collection and analysis as well as the philosophical assumptions that influence their interpretation are important in evaluating management and business research. This requires researchers to scrutinise different methods of data collection (Bryman and Bell, 2007). Similarly, Johnson et al. (2006) argue that different competing pre-paradigmatic approaches in management research, which vary in basic epistemological assumptions, influence researchers' engagement in research.

Zikmund et al. (2013) argue that business research allows managers to identify problems or opportunities present in the organisation as well as enabling organisational and environmental scanning. In other words, business research not only should make a contribution to management knowledge, it also needs to address business issues and practical managerial problems and issues (Saunders et al., 2012). Often, business research investigates an element of an organisation's internal operations, and provides information regarding the organisation, the market and the economy. It replaces the intuitive information collection with systematic and objective exploration, reducing the uncertainty in managerial decision making (Zikmund et al., 2013).

In this chapter, different philosophical approaches will be investigated. After discussing research strategy, different research methodologies will be looked at.

Finally, appropriate research methodology and methods for this research study will be identified.

3.2. Research philosophy

According to Johnson and Clark (2006), researchers need to be aware of the philosophical commitments they make through their choice of research strategy. Saunders et al. (2012) argue that the research philosophy adopted includes significant considerations about the way in which researchers view the world. There are a variety of philosophical commitments and prior knowledge-constituting assumptions about the nature of truth, human behaviour and reality, which influence the research approach and the methodology that researchers choose (Johnson et al., 2006). Similarly, according to May (cited in Stiles, 2003), the underlying assumptions and implications of different philosophical approaches to research phenomenon are significant considerations when carrying out a research project, since they will determine the research methodology and the interpretation of the research. Therefore, the following discussion highlights the main considerations associated with the different philosophical approaches.

3.2.1. Philosophical Considerations

All research is based on some fundamental assumptions about what constitutes valid research and which research methods are appropriate (Myers, 1997). These philosophical considerations include ontological considerations and epistemological considerations.

3.2.1.1. Ontological considerations

Ontological considerations are concerned with social entities and their view about reality. The question here is whether these entities have a reality external to social actors (objectivism), or wheatear they are social constructions created from people's perceptions and assumptions (constructionism) (Bryman and Bell, 2007). Schein (1988) argues that these assumptions include the nature of reality, the external environment, people, human activity and relationships. The two ontological approaches include objectivism and constructionism.

- Objectivism

Based on this ontological position, social events are external facts independent of people's influence. Therefore, an organisation is considered as a real object which has defined regulations (Bryman and Bell, 2007).

- Constructionism

On the other hand, based on constructionism an organisation and its regulations are pre-defined, and social actors and their interactions give meanings to social events (Bryman and Bell, 2007). According to Strauss et al. (cited in Bryman, 2012), this view emphasises the role of general understanding and negotiation.

3.2.1.2. Epistemological considerations

Epistemology refers to the assumptions about how knowledge can be gained (Hirschheim, 1992). It is concerned with acceptable knowledge. In other words, it is knowledge about knowledge, and refers to how one comes to know what he/she knows (Johnson and Duberley, 2000). It is argued that the way people understand events influences their behaviour and their understanding (Johnson and Duberley, 2000).

Epistemological considerations about how best to conduct research are based on the relative value of two fundamentally different and competing 'schools of thought': positivism and interpretivism (Amaratunga et al., 2002).

- Positivism uses quantitative and analytical methods to test "hypothetical-deductive generalisations". The observer/researcher should be independent of the subject being observed and there is a need to create hypotheses for subsequent verification (Easterby-Smith et al., 2012; Remenyi et al., 1998).

- An interpretive approach uses qualitative methods to inductively realise human behaviour in 'context-specific settings'. This enables understanding and describing a phenomenon, rather than looking for external causes or major laws (Easterby-Smith et al., 2012; Remenyi et al., 1998).

3.3. Relationship of ontology and epistemology to business research (the paradigm debate)

Ontological assumptions will assist in the identification of appropriate research design and research methodology. If the focus of the research is on organisations as objective social entities, then the researcher will emphasise the formal relationships within the organisation. Otherwise, the emphasis will be on general understanding of members and the active involvement of people in the creation of reality (Bryman and Bell, 2007). Based on Burrell and Morgan's (1979) study, four paradigms represent the assumptions about the nature of the social world (organisations). These assumptions are either objective, emphasising the pre-defined and formal structure of organisations, or are subjective, emphasising social constructions and the direct involvement of people in activities.

The four paradigms, which result in different kinds of organisational study, investigating different organisational problems, are illustrated in the following Table (Table 3.1);

Table **Error! No text of specified style in document.**.2. Four paradigms towards management research

Functionalism	Considers organisations as social structures with predefined functions, and emphasises problem solving which requires rational explanation
Interpretivism	Investigates the existence of organisations beyond people's conceptions, which emphasises the general understanding of people based on communication and experience
Radical humanism	Considers organisation as a social entity and emphasise the emancipation of people in organisation
Radical structuralism	Considers organisation as a power structure resulted from relationships between people in the organisation, which leads to conflict in organisation

Source: Bryman and Bell (2007)

The paradigm debate highlights the importance of the relationship between ontology and epistemology in management studies in different philosophical approaches, which, in turn, will identify research design and research methodology.

3.4. Philosophical approaches

Having discussed epistemological and ontological considerations and their relationship to management research, philosophical approaches will be investigated in depth in this part. As mentioned earlier, philosophical extremes of social research include the positivist and phenomenological schools of thought (Table 3.2) (Cassell and Symon, 1994; Miles and Huberman, 1994).

Table **Error! No text of specified style in document.**.3. Philosophical extremes

Approach	**Concepts**	**Methods**
Positivism	• Social structure • Social facts	• Quantitative • Hypothesis testing
Interpretive science (phenomenological)	• Social construction • Meanings	• Qualitative • Hypothesis generation

Source: Amaratunga et al. (2002)

3.4.1. Positivism

Based on positivism extreme, reality is objectively known and can be explained by 'measurable properties' which are independent of the observer/researcher. Positivist research tends to test theory, enhancing the understanding of phenomena. Knowledge in positivist research is derived from sensory experience and rational reflection (Myers, 1997). Positivists argue that the remoteness of the researcher from the social world is necessary and evaluation of phenomenon should be carried out through objective methodologies (Stiles, 2003). Its epistemological considerations are based on the belief in an external world, in which reality is constructed in a 'law-like manner' and human behaviour can be explained in terms of 'cause and effect' (Evered and Louis, 1991).

A positivist approach emphasises quantitative methods of data collection such as questionnaires and analytical statistical analysis such as hypothesis testing, random sampling, precision and measurement. It results in creating clear findings that fulfil the requirements of both 'generalisability' and 'reliability'.

However, it is criticised that this approach to study simply improves and expands what is already known (Easterby-Smith et al., 2012).

Johnson et al. (2006) argue that management studies are dominated mainly by the philosophical position of positivism, which is considered as a benchmark in research evaluation. Reliability and validity ensure the scientific importance of this kind of study. Based on this approach, individual and organisational behaviour can be described and analysed which results in improved decision making in organisations. Positivism is in line with Popper's (1959) falsificationist hypothetical deductive methodology which emphasises objective data collection in management research so as to test hypotheses.

Empiricism, which is based on a quantitative (positivist) approach, emphasises the study of reality based on people's experience. However, it is argued that beliefs should be tested in order to be accepted as knowledge. This 'accumulation of facts' as a legitimate aim in empiricism, is referred to as 'naive empiricism'. In other words, lack of theory development is one of criticisms of empiricism (Marsden, 1982), which suggests that facts will result in the development of theory, but it is argued that facts are produced by theory (Bryman and Bell, 2007).

3.4.2. Phenomenology

In contrast, the phenomenological/interpretive school argues that the world is socially constructed by interpretation of people within it. It emphasises the subjective interpretation of data in which knowledge is derived from human experience (Evered and Louis, 1991). Social reality in interpretive studies is constructed through social structures such as language, consciousness and shared meanings, through negotiation and interpretation. Phenomena is understood and described through everyday concepts and meanings (Myers, 1997). The focus in this paradigm shifts from defining variables to understanding human sense making (Kaplan and Maxwell, 1994).

Phenomenology requires direct and practical involvement with the phenomenon under study, in which theory is developed inductively as important elements emerge through investigation (Stiles, 2003). Phenomenology aims to develop 'situational relevance' rather than concentrating on a generalizable result (Lewin, 1951). The researcher needs to create a 'symbiotic relationship' with the environment, and needs to constantly re-evaluate findings based on the information received. Phenomenology highlights a qualitative approach to data collection and interpretation which enables developing meaning from the point of view of the participants (Stiles, 2003).

Grounded theory is one of the methods associated with phenomenology (Glaser and Strauss, 2012). It emphasises the gradual development of theory as it is grounded and emerges from the investigation, combining new insights. It advocates methods such as observation, in-depth interviews and case studies. Greater richness of data derived in this way allows the discovery of new ideas and theories. On the other hand, opponents argue that there is a possibility of generating unclear and less precise and credible pieces of work, compared to the positivist approach, as there is a possibility of distortion imposed by the principles and values of the researcher (Evered and Louis, 1991; Easterby-Smith et al., 2012). Table 3.3 illustrates some of the strengths and weaknesses of the positivist and phenomenological approaches.

Table **Error! No text of specified style in document.**.4. Comparison of weaknesses and strengths of philosophical approaches

Theme	Strength	Weakness
Positivist (quantitative paradigm)	• Provide wide coverage of the range of situations • Fast and economical	• Inflexible and artificial methods • Not very useful in generating theories • The focus is on what is, or what has been recently
phenomenological (qualitative paradigm)	• Ability to look at change processes over time • Ability to understand people's meaning • Ability to adjust to new issues as they emerge • Contribute to theory generation	• Data collection require more resources • Interpretation of data may be difficult • Hard to control pace, progress and end-points of research process

Source: Amaratunga et al. (2002)

Philosophical positions resulting from the approach of phenomenology, according to Johnson et al. (2006), are neo-empiricism, critical theory and post-modernism. These philosophical positions are discussed in the following section.

3.4.2.1. Philosophical position of neo-empiricism (qualitative positivism)

This philosophical position is based on objectivist epistemology, a realist ontology and meaningful inter-subjectivity. It emphasises the interpretations of social interaction, which results in theory being grounded in those interpretations (Strauss and Corbin, 1990). Therefore, it enables the analysis of human behaviour in organisations. This approach supports a pluralistic methodological orientation, which combines both qualitative and quantitative studies (McLennan, 1995).

3.4.2.2. Philosophical position of critical theory

The philosophical position of critical theory focuses on social constructions and reflexive communication and discourses. In other words, critical interpretation and the understanding of meanings enable emancipation (freeing people from their dependencies, limits and unbalanced power relations) and transformational change (Alvesson and Willmott, 1996; Deetz, 1992). Therefore, it requires critical consciousness and the participation of all members in collective dialogue and discourse (Johnson et al., 2006).

3.4.2.3. Philosophical position of affirmative postmodernism

This philosophical position undermines the significance of language, arguing that linguistic expressions are not clear, so there will be no true meaning in language interpretations. Therefore, language creates many realities, in which truth and reality become interpreted as uncertain linguistic constructs potentially open to constant revision (Lyotard, 1984). Discourses result in the collection of different possibilities through deconstruction, and support the creation of new discursive practices (Boje, 2001; Carter and Jackson, 1993).

3.5. Research strategy (Inductive and deductive)

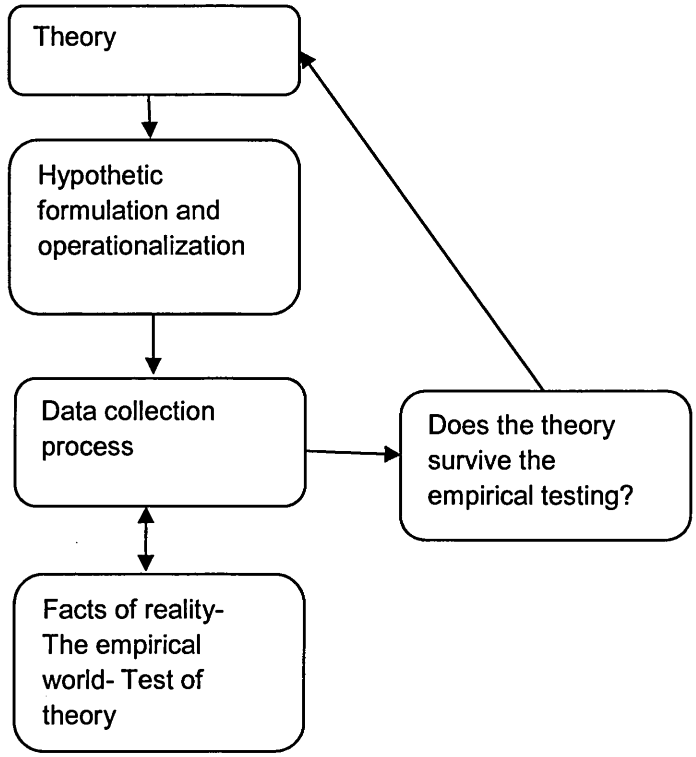
Amaratunga et al. (2002) argue that each research strategy follows a specific approach to data collection and analysis. According to Yin (2013), the type of question, the control over situation and the significance of current and past organisational events influence the choice of strategy, and allow researcher to make a balance between desired result and the chosen methodology.

It is argued that theory controls data collection and the analysis of data. In other words, the main aim of researches is to answer questions created by theoretical considerations. One of the main factors regarding the relationship between theory and research is whether the research follows deductive or inductive theory (Bryman and Bell, 2007). A theory-building study is an 'interpretive exercise', which originates from assumptions, frameworks and perceived problems. It is argued that strong theories are grounded in data. Therefore, data should help in the development of theories as well as in the verification of them (Glasser and Strauss, 2012; Yin, 2013).

3.5.1. Deductive research

In deductive research a hypothesis is deduced based on former literature about a particular subject and theoretical concerns in relation to that subject, which needs to be tested. It is argued that the theoretical significance of deductive research is not as clear as inductive research. A deductive approach, which is based on quantitative research, emphasises the importance of quantification in data collection and analysis (Bryman and Bell, 2007). In other words, this approach is objective in nature and attempts to measure phenomena. So, it is mainly concerned with numerical data collection as well as using statistical tests. It is argued that since a quantitative approach is highly structured, conducting the research itself and research analysis is easier than for a qualitative approach (Amaratunga et al., 2002). The process of deductive research is illustrated in Figure 3.1.

Figure **Error! No text of specified style in document.**.13. Process of deductive logic



Source: Gill and Johnson (2010)

One of the main features of quantitative research is that social facts are considered to explain human behaviour which can be studied using methodologies that follow 'the deductive logic of the natural sciences' (Horna, 1994). Quantitative research leads to the development of hypotheses which are testable and generalizable to the population under study. It is argued that quantitative approach is similar to the philosophical point of empiricism which emphasises the justification and verification of the theory as well as the application of the theory to the facts acquired (Chalmers, 1976).

It is believed that a quantitative approach has created explicit evaluative criteria, without clarifying how to meet those criteria, as well as leaving inter subjectivity of researcher out of data collection process (Johnson et al., 2006). One of the main weaknesses of quantitative research is that it fails to discover meaningful explanations of events in the setting, since it tends to 'take a snapshot' of a situation, which leads to measurement of variables at a particular moment. Quantitative research is mainly used in studying processes that can be divided into measurable variables. However, physiological elements and factors related to employees' capability, motivation, etc. cannot be explained properly and measured appropriately using this kind of research (Amaratunga et al., 2002).

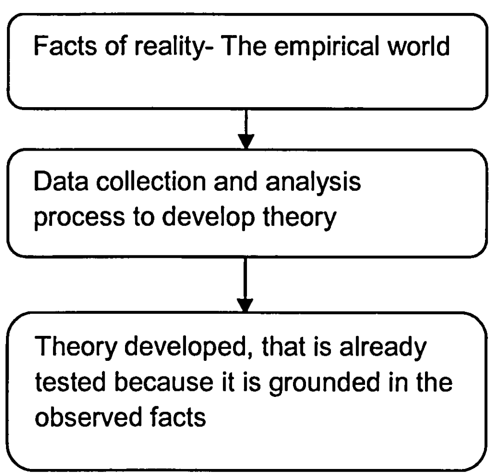
Main criticisms of deductive or positivism according to Gill and Johnson (2010) include:

- Positivism treats people as being separate from their social contexts which makes it difficult to understand people without taking account of their perceptions;
- This approach is based on highly structured research design which limits data collection, undermining results and ignoring more relevant and interesting findings;
- In this approach researchers are considered as objective entities, whereas they are a part of observation which bring their own values to the research;
- Measuring complex phenomena (e.g. a person's intelligence) in a single measure is misleading.

3.5.2. Inductive research

In inductive research, theory is created out of the process of induction, which results in generalizable assumptions reached from observation (Figure 3.2). A grounded theory approach (Glaser and Strauss, 2012) is usually used to analyse data and to create theory out of data. It is argued that an inductive approach, which is based on qualitative research, emphasises the importance of words (Bryman and Bell, 2007).

Figure **Error! No text of specified style in document.**.14. The inductive development of theory



Source: Gill and Johnson (2010)

A qualitative approach has a subjective nature, which is concerned with testing and reflecting on ideas in order to obtain an insight of human behaviour and social structures (Amaratunga et al., 2002). It highlights the importance of philosophical commitments and prior knowledge-constituting assumptions about the nature of truth, human behaviour, representation and reality. This approach has enabled flexibility and inter-subjectivity in management studies (Johnson et al., 2006).

In order to conduct qualitative research, there is a need for deep and extensive contact with a 'field or life situation', which is mainly based on the routine behaviour of people, groups and organisations (Miles and Huberman, 1994). Qualitative data focuses on 'people's experience' and 'meanings' (interpretations) that people give for events, processes and structures of their lives, such as their assumptions and insights (Van Maanen, 1979). Similarly, Amaratunga et al. (2002) argue that the focus of qualitative data is on naturally happening, normal incidents in natural settings, which attempt to reveal complexity and discover 'the real life' (reality). This kind of data is very rich and result in rich descriptions which lead to discovering truth. Moreover, the flexibility of qualitative research enables the researcher to modify data collection times and methods as the study proceeds and to have more control over the situation (Amaratunga et al., 2002). Some of the characteristics of quantitative and qualitative research are summarised in Table 3.4.

Table **Error! No text of specified style in document.**.5. Features of qualitative and quantitative research

Quantitative	**Qualitative**
• Inquiry from the outside • Are simply different ways to the same end • The results are hard generalizable data	• Inquiry from the inside • Takes into account differences between people • Aimed at inflexibility and lack of structure • The results are deep, rich and meaningful • Emphasises human behaviour

Source: Amaratunga et al. (2002)

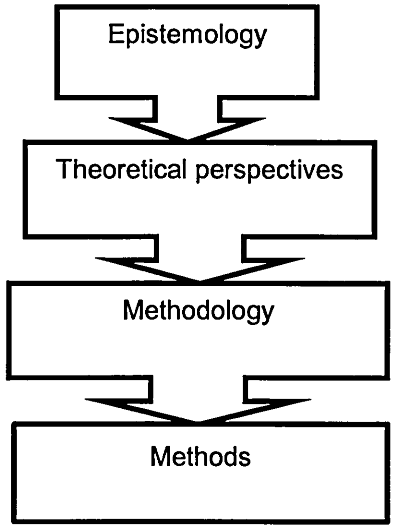
3.5.3. The mixed (balanced) approach

Triangulation refers to a combination of multiple observers, theoretical perspectives, and methodologies. It requires the researcher to determine research strategies that combine quantitative and qualitative research methods in the study of the same phenomenon. One of the advantages of triangulation is that it enables the researcher to achieve deep insights and strong results, as well as helping him to draw accurate conclusions and to make proper decisions (Fellows and Liu, 2008). According to Rossman and Wilson (1994), the other advantages of using the mixed approach are verification or authentication of methods, which enable detailed analysis of data and the appearance of new ideas and insights by turning ideas around. Mixed methods can improve the research by providing a representative sample through quantitative data, and by enabling theoretical development and implementation through qualitative approach (Amaratunga et al., 2002). Marsh et al. (1978) argue that using mixed methods will ensure the representativeness of the population under study in qualitative research.

3.6. Research methods and methodologies

Research methodology is considered as the technical structure within which the research is conducted (Figure 3.3) (Crotty, 1998). Remenyi et al. (1998) refers to methodology as the choice and use of particular strategies and techniques to gather and analyse data. In other words, methodology forms a basis upon which the research is carried out. Similarly, Leedy and Ormrod (2012) define methodology as an 'operational framework' which clarifies the facts that are placed in it. Many factors such as the topic of the research and the specific research question should be considered in order to choose an appropriate research methodology (Remenyi et al., 1998). Methodological paradigms illustrate how decisions regarding the choosing appropriate methods can be controversial, emphasising the fact that different methods are suitable for different research approaches and projects (Amaratunga et al., 2002).

Figure **Error! No text of specified style in document.**.15. Research process



Source: Crotty (1998)

Qualitative methods such as interviewing and observation, allow the researcher to take an overall image of the situation by providing rich description of processes. Smith (1992) argues that qualitative methods such as ethnography, field methods, qualitative inquiry, participant observation and case study have basically the same meaning. Some of the research methods are discussed in the following section. Finally, appropriate methodology and methods for this research will be explored.

3.6.1. Interview

Interviews are one of the most commonly used qualitative methods. The flexibility of this method and the possibility of being used almost anywhere as well as its capability to produce in-depth data are key advantages of interviewing (King, 1994). Interviews are useful method for collecting factual information as well as opinions which can be used separately or together depending upon the subject of a research. However, there are disadvantage associated with this approach including author's inexperienced interviewing techniques, time limitation, proper understanding and interpretation (Naoum, 2007).

In-depth interviews are arguably the most appropriate methods of data collection used in qualitative research, which allow for in-depth exploration of subject matter. Two main types of in depth interviews are unstructured and semi-structured interviews. Unstructured interviews are informal and allow complete freedom for the respondent. Whereas, in semi-structured interviews the researcher has a list of themes and questions to be covered (Saunders et al., 2012). According to Gill and Johnson (2010), although new theory creation is easier in completely unstructured interviews, it is difficult to remain on the subject area and discover information that would be relevant to the main subject.

Conducting the interview in a semi-structured way and using laddering technique would help avoid the interview becoming irrelevant, whilst at the same time allowing it to remain flexible enough for new data to be explored meaningfully. A key feature of a successful interview is that it should be generative and enable creating new knowledge (Ritchie and Lewis, 2003). However, success largely relies upon the researcher's ability to explore and develop appropriate topics.

Interviewing is mainly based on the opinions, perspectives, and recollections of respondents (Snow and Thomas, 1994). Kvale (1996) considers interview as a means of gathering detailed explanations of life experiences of people regarding interpretation of the meaning of the phenomena. In other words, this method emphasises the perspective of the interviewee, and the reason behind their viewpoint (Snow and Thomas, 1994).

3.6.2. Direct and participant observation

In direct or participant observation, organisational behaviour over a period of time is observed, but the researcher has little control over what is going on in the organisation (Snow and Thomas, 1994). One of the main characteristics of this method is creating close relationship with the phenomenon under study. So, there is a need for a long period of observation and in depth knowledge about situation (Mintzberg, 1979). Using direct observation researcher can obtain practical information which is not easily achievable by other research methods (Martinko and Gardner, 1990). Observing behaviour of top managers while doing their business is one example of first or direct approach (Kurke and Aldrich, 1983). One of the limitations of this method is the impact of presence of researcher on phenomenon being investigated. Another kind of observation is actual participation in the organisation, which enables the researcher to be completely familiar with the phenomena (Polanyi, 1962). However, the involvement and impact of the participant in the situation is one of the limitations of this method (Bruyn, 1970).

Ethnographic methods are of significance in conducting direct and participant observation (Rist, 1980). Ethnography emphasises the cultural setting of an organisation in explanation of phenomenon being observed. This approach enables the researcher to discover and explain the behaviour of people in making decisions and taking action in organisation (Snow and Thomas, 1994).

Waddington (2004) argues that participant observation is best approach under following research conditions:

1. When there is an emphasis on the human meanings and their interpretations and interactions;
2. When the phenomenon under study is too vague to be easily understood and discovered;
3. Where there is little information and knowledge about the phenomena.

3.6.3. Questionnaire survey

The survey is one of the most commonly used research designs, which is based on self-reports of factual data and researcher's belief. The survey is done in a homogeneous group with respect to at least one characteristic, such as 'industry or use of a common technology' (Flynn et al., 1990).

The questionnaire survey enables researchers to have access to larger sample of respondents and organisations (Dess and Davis, 1984). The efficiency of questionnaire, in terms of high speed, low cost, high quantity, allows researchers to collect large amounts of data that can be analysed statistically. Moreover, sometimes questionnaires are used for data collection in different time periods (Gomez-Mejia, 1988). However, one of the main constraints of questionnaire surveys is low response rate, which influence the generalizability of survey results to the population under study (Gaedeke and Tootelian, 1976). In order to remove this disadvantage, Dillman (1978) suggests 'total design method' which allows the researcher to discover and deal with factors that have impact on quality and quantity of response, and enables the survey to be carried out and accomplished based on planned programs.

As discussed earlier, questionnaire survey, which is commonly used in management studies, is an efficient data collection method. However, it is less flexible than interviewing (Snow and Thomas, 1994). Moreover, in questionnaire surveys different interpretation of respondents from items of questionnaire is likely to be a source of error (Fredrickson, 1986). Naoum (2007) argues that questionnaires are the most popular data collection technique, with the advantages of economy, speed and consultation, and disadvantages of no control over responds and being inflexible and repetitive technique for industry. Furthermore, it is argued that appropriate questionnaire design is essential in order to ensure obtaining valid responses to the questions (Naoum, 2007).

The reliability and validity of a survey instrument adds to the quality of the results, making it an appropriate method for data collection, especially when results need to be generalised to a larger population. However, as discussed earlier, an obstacle to using survey design is the possibility of low response rates that can affect the ability to generalise the results (Schuh and Associates, 2011)

3.6.4. Field Simulation/Experiment

In the field experiments, the researcher, by manipulating some features of the natural setting, attempts to observe the resulted changes (Stone, 1978). Since this kind of study is taken place in the natural setting, it has much bigger external validity than lab experiments. However, the researcher has limited control over the natural setting, which, in turn, may prevent correct conclusions about causality (Flynn et al., 1990).

Field studies investigate real managers and organisations. Field simulation is mainly used in strategic management and strategy formation studies. Based on the field method, managers' decision making, within a situation created by researcher, is analysed. Using this method, managers, who deal with efficiency, different strategy processes and potential problems in the firms, respond to written case scenarios by answering a questionnaire (Thomas and McDaniel, 1990). The written scenarios enable the researcher to have some degree of control over the situation created for the manager, like laboratory conditions. Since managers have been asked to involve themselves in simulations, the data resulted from the study reflect the insights and experiences of people who actually have role in strategic making decisions. Therefore, using written scenarios allows researchers to have access to intuition of experts as well as creating some control over the situation. On the other hand, since 'hypothetical situations' are described in scenarios, the researcher cannot be sure that managers will have same behaviour and interpretation on real circumstances as they responded to scenarios (Fredrickson, 1986).

3.6.5. Quasi-experiments

Quasi-experiments are strong methods for conducting a field research, because, unlike other field methods, they use 'control groups' which enable researchers to ensure the strength and validity of results. Venkatraman and Zaheer (1990) conducted their study using a control group design with 'pre-test and post-test' to investigate the impact of a technological change on the performance of organisations. It is argued that this method is combination of several field methods discussed earlier. For example, many strategic management studies have conducted interviews to pre-test a questionnaire. This multi-method approach is in line with triangulation (Jick, 1979), which is defined as a combination of methods used to study the same phenomenon. Based on this approach, the 'counter-balancing strengths' of a method will cover and compensate the limitations of another method (Rohner, 1977). Therefore, the researcher will be assured that the variance happened between subjects appears because of subject attributes rather than of method (Campbell and Fiske, 1959).

One of the limitations of using such approach is that designing strong quasi-experiments may be difficult (Snow and Thomas, 1994). Moreover, using several field methods can result in 'analytic diversity'. As discussed earlier, it is argued that multi method approach only leads to triangulation, which means that a phenomenon is investigated from various angles, but this viewpoints share common errors which influences the validity of study (Venkatraman and Ramanujam, 1987).

3.6.6. Case Study

Case study is defined as "*intensive analysis of a single instance of a phenomenon being investigated*" (Amaratunga et al., 2002, p.26). Case studies attempt to explore new organisational behaviours and processes. The single case study focuses on operations of a single plant, while in multiple case studies detailed operational information at different site is documented. When analysing the data, the focus is on the documentation of similarities and differences between the sites (Flynn et al., 1990). According to Yin (2013), case study is an experimental study of phenomenon in 'real-life context', which leads to creating emergent theories. The main emphasis of this method is on understanding business processes as they happen in their context. The researcher, in order to obtain information about organisational behaviour and their common and unique characteristics, attempts to interview people in the organisation or study life history documents. The possibility of 'open-ended inquiry' in case studies allows the researcher to draw on inductive methods, which emphasises the generation of theory and hypotheses rather than simply testing them (Amaratunga et al., 2002).

3.7. Methodological approach in this research

As discussed in this chapter, different competing pre-paradigmatic approaches in management research, which vary in basic epistemological and ontological assumptions, influence researchers' engagement in research (Johnson et al., 2006). It is argued that philosophical assumptions influence the interpretation and evaluation of management and business research (Bryman and Bell 2007). Moreover, nature and main focus of research influence the approach used by researchers. All these issues require researchers to investigate different data collection methods and methodologies. The main focus in this research is on the exploration of the existing phenomenon (electronic supply chain practice) in companies through an investigation of related social structures (information systems and electronic networks) and their norms, in order to assist them through problem solving (adoption of E-Business technologies to enhance integration, information sharing, etc.). Therefore, having considered the four paradigms towards management research, this research adopts a functionalist view. This view emphasises objectivity, and considers society as a series of social structures with predefined functions. Additionally, in this research, the researcher attempted to explain objectively known realities related to the use of electronic supply chain management (e.g. successful adoption of electronic supply chain management, critical success factors, barriers, etc.) by defining measurable properties extracted from the literature review, and consequently the researcher will test theories in order to enhance the understanding of the existing phenomenon (electronic supply chain practice in SMEs). Moreover, this research attempts to investigate how and to what extent E-Business technologies and electronic supply chain practices are implemented in supply chains as well as looking into the benefits and impact of E-Business technologies on the competitiveness of companies. In other words, this research intends to provide wide coverage of issues around electronic supply chain management, and is based on the philosophical approach of positivism that believes social facts can be explored through social structures. These structures are believed to have predefined rules and regulations (Amaratunga et al., 2002). Therefore, considering the objective nature of this research and having discussed the ontological and epistemological considerations and different philosophical approaches, the researcher decided to adopt a positivist approach for conducting this research. Positivist approach follows a deductive/quantitative research strategy. Consequently, based on the literature review of electronic supply chain management and the main objectives of this research, hypotheses are created to be tested. Finally, having decided on a deductive approach, and considering the benefits of survey research compared to other research methodologies, including advantages of economy, speed and generalizability, a quantitative survey research methodology is employed for this research. This methodology uses questionnaires as a method of data collection. The questionnaire will allow the researcher to collect large amounts of data that can be analysed statistically, without the researcher having impact on the interpretation of results (emphasising the objectivity of research). It is hoped that reliability and validity of the survey instrument will add to the quality of results of the research.

Chapter 4. **Data Collection**

4.1. Introduction

After investigating various philosophical approaches and research methodologies, and deciding on quantitative survey research, designing a measurement instrument (questionnaire) is necessary. In this section, survey research design, procedures for operationalising research questions and measurement scales development will be discussed. Further, sampling framework, units of analysis, and reliability and validity issues will be explained. And lastly, difficulties involved with the data collection process in this research study are investigated.

4.2. Survey research design

As discussed in the research methodology chapter, this research followed a survey methodology for data collection. Given the context of this research, it was intended that this methodology would assist the researcher to measure and infer to a large population, enabling comprehensive analysis of electronic supply chain management. High reliability, low cost of the implementation of the research and the possibility to manage from remote locations are believed to be main strengths of survey methods, especially with reference to this specific research (Jackson, 2012). On the other hand, there are some limitations to the adoption of survey methods. For example, standardised questions require the researcher to develop general questions, which limits the answer to research questions. Moreover, high reliability requires a large response rate, which in turn necessitates a large sample. It is argued that inability to measure, or ignorance of behavioural and social factors, such as level of knowledge and attitude of managers and employees toward the adoption of electronic business, as well as inability to create connecting relationships between various variables (e.g. factors influencing E-supply chain management adoption in SMEs) were main issues involved with the use of survey methodology in this research (electronic supply chain practice) (Denscombe, 2010).

4.2.1. Designing a measuring instrument /Questionnaire

Measurement is the process of quantifying observations. A measurement instrument is a standardised tool which follows specific procedures to quantify observations (Liu, 2010). The quality of the measuring instrument has a major impact on the credibility of an assessment. Two technical features of measurement used to judge quality and suitability of instrument are validity and reliability (Schuh, 2009), which will be discussed in depth later on in this chapter.

4.2.2. Operationalising research questions

A questionnaire is constructed based on the theory which underlies it, in order to develop or test that theory. The literature and logic behind the investigation leads to defining a theory. The resulting theory, which includes various variables related to the research, attempts to illustrate the relationships between the variables in the theory (Flynn et al., 1990). Operationalization means specifying a set of variables (e.g. operations or behaviours) that can be measured and manipulated. A general research aim should be translated into more specific research elements and specific questions to which specific and concrete answers can be given (Cohen et al., 2011). Operationalization creates indicators or measures which represent observable and practical cases of the concepts. In other words, operationalization leads to construction of specific instructions about rules of observing (Gill and Johnson, 2010).

Survey concepts which require quantitative measurement must be translated into appropriate data items. This is necessary for ensuring the reliability of statistical information across data collection (Cox et al., 2011). Dealing with relations between items and structures involves quite different psychological processes such as casual thinking. Casual thinking is about how people reason. In casual thinking the task is to "*single out, from a multitude of data, pairs of acts between which there is a necessary connection*" (Angyal, cited in Boonstra, 2004, p.60).

In this research, in order to be able to measure the level of success of E-Business adoption and to evaluate the impact of E-supply chain practice in enhancing competitiveness of companies, some themes needed to be discovered based on discussions in the literature review. Some of these themes include: technological; organisational and environmental factors influencing adoption of E-Business in companies; E-Business drivers; and factors influenced by the adoption of electronic supply chain management.

After discussing and analysing a pool of items extracted from the literature review, and critical analysis of themes, some of the main chosen items (key indicators) are illustrated in Tables 4.1-4.3.

Table **Error! No text of specified style in document.**.6. Technological, Organisational and Environmental factors influencing the adoption of electronic supply chain management

Factors influencing the adoption of electronic supply chain management	
Technological factors	• Integration level of the IS/IT capabilities in the strategy
Organisational factors	• Management attitude, commitment and support • Attitude, knowledge and acceptance of employee • Organisational IT competence • Knowledge management • Inter-organisational relationships • Size of the firm • Age of the firm • Culture
Environmental factors	• External pressure; ✓ Competitive pressure ✓ Business partners' pressure ✓ Customer requirements • IS vendor support • Financial resource availability • Industry • Government

Based on: Haug et al. (2011); Huang et al. (2008); Li et al. (2010); Simpson and Doherty (2004); Wang et al. (2013); Leidner and Kayworth (2006); Grandon and Pearson (2004)

Table **Error! No text of specified style in document.**.7. Main E-Business drivers

Main E-Business Drivers
• Globalisation • Customer requirements • Standards and protocols • Appearance of information and communication technologies • Closer integration with suppliers and customers • Fast responsiveness • Business flexibility • Increased competitiveness • Integration on connectivity within the organisation

Based on: Moodley (2001); Chopra and Meindl (2012); Giménez and Lourenco (2008)

Table **Error! No text of specified style in document.**.8. Factors influenced by adoption of ESCM

Factors influenced by adoption of ESCM
• Supply Chain Management (SCM) • Customer Relationship Management (CRM) • Innovation • Product design • Inventory management • Management of distribution channels • Order processing • Production • Demand management • Lead time management • Services and support • Marketing • Sales • Procurement • Communication and integration • Manufacturing flow management process

Based on: Devaraj et al. (2007); Paulraj et al. (2008); Moodley (2001); Croom (2005)

4.2.3. Attitude measurement and Likert scale

According to Eagly and Chaiken (cited in Albarracín et al., 2005, p.631), attitude is a *"mental tendency to evaluate some entity with some degree of favour or disfavour".* Attitude measurement depends on the attitudes towards responses being discovered, either verbally or non-verbally. Finally, after outlining the processes by which the researcher believes attitudes are expressed, criteria for optimal measurement are outlined (Albarracín et al., 2005). A Likert scale is one of the simplest examples of scaling in social science (Buckingham and Saunders, 2004). The methodology in Likert scale is developed based on formulating a set of statements relating to the research problem. A group of people is asked to state the content of their agreement or disagreement with each statement, using some scales (Taylor et al., 2006). In other words, several response categories are created, and each category is assigned a score which demonstrates the strength of agreement or disagreement of respondents. And finally, total scores from each respondent's answers will measure the respondent's attitude.

Measurement development in this research study was based on the adoption of scales from academic literature wherever possible. As illustrated earlier, first, the area of each construct was clearly defined, and the main items to be included in the survey were identified. Second, the literature was reviewed to explore any relevant scales available for the research. This research mainly uses 5 point Likert scale, for example ranging from "not significant" to "very significant", as well as using some closed questions with yes/no responses.

4.2.4. Pilot Testing

One of the main steps in questionnaire construction is pilot testing, which refers to the initial administration of a questionnaire to a small group of respondents. Pilot testing allows the researcher to obtain beneficial feedback from respondents in terms of clarity of questions in the questionnaire, existence of unclear or out of respondents' range of knowledge and the appropriateness of the questionnaire instrument. In other words, pilot testing, enables the researcher to be aware of weaknesses of the questionnaire, and to take action in revising it, in order to ensure the "validity and reliability" of the measures. In pilot testing a random selection of a sample is not necessary. Therefore, a convenience sample selected from a small subset of the research population is quite acceptable (Flynn et al., 1990).

The designed questionnaire for this research was amended several times and scrutinised by experienced academic researchers in supply chain management. Moreover, in order to enhance the quality of scales, the scales were pre-tested by carrying out a pilot study. Subsequently, the questionnaires were sent to 20 people in order to make sure that the surveys were comprehensive and straightforward. The feedback received from respondents helped to improve the questionnaire by assisting the researcher to ensure the validity of the questionnaire.

4.3. Reliability and validity

Considering issues regarding the evaluation of research results is a significant part of the review of research methods. The evaluation attempts to measure and neutralise the limitations inherent in research strategies (Then, 1996). Main evaluation criteria include terms such as 'validity', 'reliability' and 'generalizability'. In order for the data collected by surveys and other empirical designs to be trustable and usable, the reliability and validity should be demonstrated. In other words, the validity of results and the extent of contribution of research to knowledge determine the value of any research. Different philosophical approaches about the nature of reality and different research methodologies (qualitative and quantitative) influence the evaluation criteria in a research project (Amaratunga et al., 2002). The evaluation criteria of validity and reliability are mainly originated from the notion of a quantitative research paradigm. In qualitative research, the mentioned criteria are referred to as accurate techniques of data collection and analysis (Miles and Huberman, 1994; Easterby-Smith et al., 2012).

4.3.1. Validity

Borden and Owens (2001) describe validity as involving consideration of whether an instrument actually measures what it claims to measure, which plays an important role in determining the quality of the measurement instrument. Similarly, Flynn et al. (1990) argue that validity attempts to measure if items or scales in a questionnaire really measure what they are supposed to measure. In other words, validity is concerned with appropriateness of answers provided by research (Then, 1996). A measure which is valid measures defined ideas and conceptions. The validity of a measure depends on how concepts have been defined and conceptualised (De Vaus, 2002).

Validity can be measured based on internal and external validity (Gill and Johnson, 2010). Internal validity refers to whether or not identified causes of a particular problem in fact generate interpreted 'effects' (responses). It attempts to ensure accurate cause-effect relationships. Then (1996) argues that internal validity attempts to ensure that research outcomes support the conclusions of the research. On the other hand, external validity is concerned with the extent to which research results can be applicable and generalised beyond the sample, which can be assured by establishing accurate theoretical relationships (Amaratunga et al., 2002).

The complexity of what is being measured influences validity. According to McMillan (2008), face validity is concerned with inspecting the extent to which items in a research instrument are representative of a field of construct. Face validity is generated by having specialists examine the content of the instrument and consider the degree to which the items measure the criteria. The internal structure of an instrument, which indicates how items within the instrument relate to one another, should be consistent with the theory or proposed use of the scores (McMillan, 2008). Another kind of validity, which is construct validity, refers to the ability of a measurement instrument to accurately measure a theoretical construct or trait that is designed to measure. It emphasise the potential of a scale in terms of appropriate definition of constructs and variables. For example, expressions such as "job satisfaction" cannot be directly measured, since they are composed of multiple rather than singular variables; these kind of terms are usually understood from scores on summated scales which are supposed to measure them (Jackson, 2012).

The other dimension is content validity, which is the extent to which the content covers a representative sample of the field of behaviours to be measured. In other words, it is the evaluation of items in terms of the extent to which they measure the theory and conception that they are aimed to measure. This judgement is done by experts and with reference to the literature. Therefore, in order to discover the content validity, the researcher needs to consult with experts in the areas being tested. Establishing content validity is very significant. In depth rational analysis and theory formulation can allow the researcher to carefully examine content, before starting to collect data (Flynn et al., 1990).

Last but not least, criterion validity focuses on a practical relationship between the scores in a questionnaire (predictor) and an objective result (the criterion). This kind of validity can be measured using a computing 'validity coefficient', which is the correlation between predictor and criterion scores (findings). It demonstrates the extent to which criterion scores can be predicted from the instrument score. A high value of validity coefficient indicates that the measuring instrument has criterion-related validity (Flynn et al., 1990).

4.3.2. Reliability

Reliability is the extent to which a research study is able to create same results under similar conditions (Yin, 2013). In other words, reliability is repeatability; therefore, a measuring instrument is reliable, if it generates the same outcome in the same circumstances (Simon and Burstein, 1985). Reliability aims to reduce the possibility of appearance of mistakes and biases in research. According to Then (1996), the focus of reliability is mainly on data collection process in order to ensure consistency of research outcomes. In order for research to be meaningful and valid, it needs to be reliable at the first place. In other words, even highly valid results need to demonstrate consistent results over a period of time (Schwab, 1980).

McMillan (2008) argues that reliability relates to whether the instrument is consistent, showing the extent to which participants' scores are accurate. Estimates of reliability include stability, internal consistency, and agreement. Stability is determined by administrating an instrument to a group, waiting a period, and then administrating the same instrument again to the same group. The connection between the scores offers test-retest reliability. Internal consistency shows the extent of consistency in the answers of participants to items measuring the same quality, and agreement refers to correlation or percentage of agreement, which can be applied when pilot testing an instrument with a small number of individuals (Schuh, 2009). Dillman (2011) states that interviewing with potential respondents, and asking them to “think aloud” when completing the instrument allows the researcher to see whether the questions are interpreted similarly among respondents.

In general, Schuh (2009) offers the following checklists for enhancing the quality and reliability of a measuring instrument:

1. Having the instrument examined by an expert;
2. Identifying similar items and the relation between them;

3. Having the instrument answered by the same group at different period of times in order to check test-retest reliability;
4. Checking internal consistency of the instrument;
5. Doing interviews with potential respondents;
6. Conducting pilot study;
7. Having the instrument reviewed by people who are not involved in the research process.

In this research, validity was ensured mainly by checking internal validity and face validity, and reliability was ensured through conducting a pilot study. After designing a measurement instrument, and ensuring reliability and validity, appropriate companies will be selected from a sampling frame.

4.4. Sampling

Sampling theory is the study of relationships between a population and sample drawn from the population. It enables estimation of unknown population quantities/parameters (such as population mean, variance, etc.). Sampling theory develops sampling methods at the lowest possible cost and enables precise estimates (Sabatella and Franquesa, 2004). The advantages of sample survey, according to Singh and Mangat (1996), include greater speed and accuracy, more detailed information and reduced cost.

A sampling scheme is used in drawing the sample, which refers to the collection of methods or rules for the selection of the sample. A great number of different samples could be drawn from a population using a sampling scheme, and different statistical estimates are gained from the sample for an unknown population parameter (Pfeffermann and Rao, 2009). A unit of analysis is the unit about which the researcher finds information. In survey research, the units of analysis often are individuals (De Vaus, 2002). A list of all the units in the population to be sampled is termed a sampling frame (Singh and Mangat, 1996). Pfeffermann and Rao (2009) believe that the selection of the elements from a sampling frame is a critical part of survey processes. Bethlehem (2009) argues that there is a relationship between precision of estimators (rules of calculating an estimate of a given quantity, based on observed data) and the sample size; large samples give precise estimators, however, a large sample tends to be costly and time consuming. Therefore the sample size is determined based on a compromise between cost and precision.

Sampling techniques include probability sampling nad non-probability sampling (Singh and Mangat, 1996), which will be discussed in the next section.

4.4.1. Probability and non-probability sampling

The foundation of survey design for probability samples were developed with the goal of decreasing the survey cost while controlling the uncertainty associated with key estimates (Pfeffermann and Rao, 2009). In probability sampling, each unit in the population has a definite probability of being selected in the sample (Singh and Mangat, 1996). Various kinds of probability sampling include simple random sampling, stratification, and multistage cluster sampling. Stratified sampling divides members of the population into homogeneous subgroups before sampling. In other words, it takes into account the different sub-groups of people in the population, and ensures that the sample accurately represents the population on certain charactristics. On the other hand, when the population is too large, it is common to use cluster sampling, which involves selecting participants who are already part of a group or cluster (Jackson, 2012). In simple random sampling each element has the same probability of being selected in the sample, whereas in systematic sampling a random starting point is selected in the sampling frame and from that point elements are selected repeatedly jumping forward a fixed number of elements (Bethlehem, 2009). It is argued that random selection of a sample is necessary, in order to conduct research without bias. Flynn et al. (1990) argues that when drawing a sample from a particular group, such as companies using a certain kind of technology or companies conducting their business in a certain industry, the sample should be selected as randomly as possible.

In contrast to probability sampling, in non- probability sampling samples are selected without using any probability methods. For example, in convenience sampling the sample is limited to a part of the population that is readily accessible, and purposive sampling is used when skills are requied to make a representative subset of population. In quota sampling quotas are craeted for different categories of population based on considerations relevent to the research, and selections within the categories are based on personal judgements. It is argued that all these methods are subject to human bias (Singh and Mangat, 1996). Sabatella and Franquesa (2004) contend that sample bias happens as a result of inappropriate sample selection as well as through non-response.

The probability theory was used to generate samples from the population of around 5000 companies. The sampling scheme was based on simple random sampling (each unit has the same probability of being selected in the sample) with a sample size of 500. The population under study in this research is manufacturing SMEs in the UK, which produce technological products, and the units of analysis are managers of companies. The researcher created the sampling frame for the research using the "Library gateway" and "fame database" in SHU-space (database of Sheffield Hallam University), which helped the researcher to find manufacturing SMEs in the UK and required information about them, including the number of employees, their main activities and address. Using probability theory, it is hoped that the sample will be representative, and that generalisation can be reliable.

4.4.2. Sampling variation and confidence interval

All samples differ and the relevent variation is slightly different depending on whether the researcher is looking at quantitative continuous data or qualitiatve ordinal or nominal data (Carver and Nash, 2012). The difference among samples is called sampling variation. Sampling error describes the variation of the estimates calculated from the possible samples. A sampling scheme described in the design of sampling procedure should give the smallest possible sampling error (Lehtonen and Pahkinen, 2004).

The sample size in probability sampling is dependent on sampling variation, which can be measured by determining the standard error for each statistic. In other words, standard error, which is dependent on sample size, is used for measuring precision, and is concerned with measuring the variation of distribution of sample mean. A large variation in sampling statistics represents that survey findings are likely to vary a lot from one sample to another. It is believed that larger samples tend to result in more precise statistics. In other words, as sample size increases, sampling error decreases which leads to increased precision (Gravetter and Wallnau, 2010). The standard error of the statistic (sample mean) of respondents for a special factor can be directly obtained from SPSS statistical software. The standard error provides an estimate of how close the sample mean is to the true population mean, which is used as a measure of the sampling error and calculating confidence intervals (Lehtonen and Pahkinen, 2004).

A Confidence Interval (CI) is a special kind of interval estimate of a "population parameter" which demonstrates the reliability of an estimate. It is constructed so as to have a particular property. "*This property is that over a large number of sample observations, the proportion of items that the true parameter value fall inside that range is equal to a predetermined value known as the confidence level*" (Pfeffermann and Rao, 2009, p.17). Confidence intervals demonstrate how confident one can be that the 'true population value' falls between the points. Usually large sample size results in very narrow and hence precise confidence intervals. Confidence interval determines the precision of a sample by using two factors of standard error and the level of certainty desired (95%, 99%, etc.) (Dattalo, 2008).

4.5. Data collection process and limitations in this research

As mentioned earlier, the sampling scheme in this research was based on simple random sampling. After going through the website of selected sample SMEs and ensuring their eligibility (such as number of employees, industry), the researcher contacted most of the companies, and asked for the name of at least one of the appropriate informants (mainly managers) and ensured the correct postal addresses for the companies.

The researcher came across some issues while accomplishing this process of the research. First of all, making phone calls and talking the companies through the survey was a rather difficult and time consuming process. Some of the companies that the researcher contacted were not interested in cooperating. The other problem was that, most of the companies had 'no name policy', and were not able to give the name or email address of a specific manager for data protection reasons.

After receiving responses and going through them, the researcher realised that sometimes there were tendencies for respondents to focus on the average points or vice-versa the extreme points for most of the answers in the questionnaire. For example, in some cases, in a question with the values of "not relevant, not significant, marginally significant, significant, very significant", most of the answers for the sub questions were "not significant" or "very significant". Similarly, these extremes were used to answer other questions of the questionnaire. In some other cases, the answers given by single respondents were concentrated around the average points of "marginally significant" and "significant" for most of the questions. This issue could reflect personal attitude and philosophy. However, it was also acknowledged that this kind of bias could influence final research results.

Moreover, sometimes, especially for the questions with more than 10 sub-questions, the first several sub-questions had been answered carefully, but the researcher believes, for the last ones, an answer had just been repeated without really being gone through them. This issue could be because of a problem of this specific questionnaire, which some of its questions had too many sub-questions to be answered patiently and carefully. The other concern for the researcher is that in some questionnaires, the same answer had been repeatedly chosen for all the sub-questions of a question. Whether answered correctly or not, the researcher expected a variety of responses for a detailed data analysis. Last but not least, the qualification, knowledge and personal attitude of respondents as well as their limitation to answer honest questions are issues of concern in this research. In order to eliminate some of the limitations mentioned in this part, the unreliable questionnaires were decided not to be included in data analysis.

4.6. Conclusion

Data collection in this research is based on survey methodology, which involves designing a measurement instrument (questionnaire), and aims to quantify observations (Liu, 2010). In order to measure research constructs and operationalise research questions, the general aim of the research should be translated into more specific research elements. So, a series of operations or behaviours should be specified (Cohen et al., 2011). In other words, operationalization requires survey concepts to be translated into more specific data items, which need to be measured. In measuring the level of success of E-Business practice in the supply chains of companies, E-Business drivers as well as the organisational, technological and environmental factors influencing adoption of E-Business in companies were discovered. Likewise, in evaluating the impact of electronic supply chain management in the competitiveness of companies, the organisational and managerial elements that can be influenced by successful adoption of E-Business technologies, as well as benefits and disadvantages of these technologies were explored. As discussed in the operationalization part, after discussing and analysing a pool of items extracted from the literature review, key indicators were selected to be included in the questionnaire. Measurement development in this research has been mainly based on the adoption of scales from literature. Having defined the area of each construct, the main items to be included in the survey were explored and identified. Finally, in order to discover relevant scales available for the research, the literature was carefully reviewed. As mentioned earlier, 5 point likert scales, mainly ranging from "not significant" to "very significant" were selected to be used for this research. Moreover, a few closed questions with yes/no responses were used too.

Given the fast obsolescence of technological goods, this research mainly focuses on manufacturing SMEs in the UK which produce technological products. "SHU-space" and "library Gateway" were used to explore and contact appropriate SMEs, and the probability theory of simple random sampling was used to create a sampling frame from the population of around 5000 companies. Finally, a sample size of 500 companies was selected for further consideration and questionnaire distribution. In general, considering fast and rather simple data collection and analysis of questionnaires, a quantitative survey approach can be a very efficient research method. However, lack of opportunity to have personal contact with respondents prevents or restricts communication and the opportunity for clarifications, and, also, restricts access to in-depth and detailed data. Moreover, the eligibility of respondents (their position in the company) as well as their level of understanding and knowledge influences the effectiveness of questionnaire (Barnes, 2001).

Chapter 5. **Data Analysis**

5.1. Data preparation and presentation

The kind of variables (categorical, continuous) that the researcher uses will determine the statistical tests in analysing data. The choice of kind of variable to use is dependent on research questions. Categorical variables are variables that can take on specific values only within a defined range of values. There is no middle point for these variables, in the sense that they can only belong to one value (e.g. gender). On the other hand, continuous variables can take on any value along a range of values (e.g. age). Greater degree of precision in measurement is one of the benefits of using these kinds of variables (Marczyk et al., 2010). This research mainly uses categorical variables, which include ordinal and nominal scales. Ordinal scales emphasise the order or ranking of the variable to be measured. Although these scales differentiate among rankings of variables being measured, they do not show how much of a real difference exists in the measured variable between rankings. Nominal scales, simply categorise variables to be measured into one of a range of defined categories (Ho, 2006).

5.2. Data analysis

As aforementioned, this research is mainly based on categorical variables. It attempts to investigate the integration of E-Business and supply chain management and to address the following issues in line with the research objectives:

1. The impact of electronic supply chain practice on the improvement of supply chain management and the integration of supply chains.
2. Barriers and advantages of the successful adoption of E-Business technologies in the supply chains of companies
3. The impact of organisational and environmental factors of the proposed model on successful electronic supply chain implementation

The data analysis for this research is carried out based on main objectives of this research, in 2 stages of univariate and bivariate analysis as well as hypothesis testing analysis for each of the related variables.

5.2.1. Univariate and bivariate analyses and test of statistical significance

Univariate analysis allows the researcher to get to know their data. It is the simplest form of quantitative analysis which is concerned with analysing a single variable in terms of description and discovering the distribution of its attributes. Univariate analysis for categorical data includes frequency distributions, averages and measures of dispersion. On the other hand, bivariate analysis is the analysis of 2 variables simultaneously. It attempts to analyse the variables and their empirical relationships. Running a percentage table (crosstab) or the computation of a simple correlation coefficient are examples of bivariate analysis (Babbie, 2010).

A test of statistical significance is where sample statistics drawn are generalised to estimate their population parameters. It adds considerable weight to random sample findings, determining whether the statistical findings are only valid within the sample or whether they actually exist within the population (Bergh and Ketchen, 2009). The simplest type of hypothesis tests uses two statements; null hypothesis and alternative hypothesis. A null hypothesis assumes that the two variables are independent and no association exists between them (Singh and Nath, 2010). Hypothesis testing in bivariate analysis is done through identifying Chi-square P value and Cramer's V.

P value is the probability that, under the null hypothesis, a sample statistic would occur. This value should be 5% or less than 5%, which means that if a sample statistic is found to occur only by chance for 5% or less of the times, it is considered as being very small, and the null hypothesis is rejected, which means that the association of the two variables is accepted. In order to identify the strength of the association, the value of Cramer's V should be identified. Cramer's V takes values from 1-0 and the closer the statistic is to 1, the stronger the association would be.

Most statistical tests including Chi-square tests should meet certain assumptions, these assumptions include:

1. Items in each cell should not appear more than once
2. The expected value of each cell should be 5 or more (20% of most cells can have an expected value of less than 5)

3. Test must be accomplished based on actual counts not percentages.

This research uses 'null' and 'alternative' hypotheses to test the association between variables. Since all the variables chosen to be analysed in this research are categorical, the bivariate hypothesis testing scenarios will be based on chi-square tests of association and the identification of Cramer's V through running table of symmetric measures.

5.3. Data analysis part 1: Data analysis for investigating the impact of electronic supply chain practice on integration of supply chain processes

In order to investigate the impact of E-Business technologies on the integration of business processes in supply chains, firstly the impact of E-Business on each of the following elements of SCM, which have been extracted from literature review (see table 4.3), are discovered:

1. Customer relationship management
2. Marketing research
3. Management of distribution channels
4. Order processing
5. Production
6. Logistics and returns process
7. Product development
8. Planning synchronisation
9. Manufacturing flow management processes
10. Lead time management
11. Inventory management
12. Procurement
13. Fulfilment
14. Demand management processes

5.3.1. Univariate analysis (Frequency Tables)

So, having carried out univariate analysis for each of the factors discussed above as well as for the variable of helpfulness of E-Business technologies in supply chain integration, the following frequency Tables would appear.

Table **Error! No text of specified style in document.**.9. Helpfulness of E-Business on supply chain integration

		Frequency	Valid Percent
Valid	not relevant	9	13.8
	not helpful	10	15.4
	marginally helpful	19	29.2
	Helpful	20	30.8
	very helpful	7	10.8
	Total	65	100.0
Missing	System	2	
Total		67	

Table **Error! No text of specified style in document.**.10. Impact of E-Business on supply chain management

		Frequency	Valid Percent
Valid	not relevant	14	20.9
	not beneficial	2	3.0
	marginally beneficial	22	32.8
	Beneficial	20	29.9
	very beneficial	9	13.4
	Total	67	100.0

Based on univariate analysis of the impact of E-Business on supply chain management and integration of supply chains, 10.8 % of respondents agreed that E-Business technologies have been "very helpful" for the integration of their supply chain. Similarly, 13.4 % of companies believed that the adoption of E-Business technologies has been "very beneficial" to improvement of their supply chain and only 3% rejected this idea. However, around 30 % of companies (30.8 and 29.9) agreed that adoption of E-Business technologies has been "helpful" and "beneficial" to both the integration of business processes and improvement of supply chain management.

Next univariate analyses were used to examine the impact of E-Business on different supply chain business processes including: customer relationship management; marketing research; management of distribution channels; order processing; production; logistics; and returns process; etc. (Appendix A.5, Table A.5.1 to Table A.5.14). Having looked at the impact of E-Business on each of the supply chain processes, it seems that the use of E-Business has been "very beneficial" to order processing (in the case of 34.4% responses), followed by procurement (in 28.4% of responses), inventory management (in 19.4% of responses), customer relationship management (in 17.9% of responses), production (in 16.4% of responses) and logistics and return processes (in 16.4% of responses). On the other hand, less than 15% of companies believe that E-Business technologies have been very beneficial to marketing research (14.9%), management of distribution channels (11.9%), lead time management (11.9%), manufacturing flow management (10.4%), fulfilment (9%) and product development (7.5%).

Considering the main focus of this research - identifying the patterns of success - and in order to be able to do an in-depth analysis of data for exploring overall benefits of E-Business adoption (both "beneficial" and "very beneficial"), as well as ensuring that statistical tests including chi-square tests would meet certain assumptions, all the variables discussed above were recoded as following (Univariate analysis after recoding)[1]:

[1] The researcher would like to collapse the variables based on the main focus of this research which attempts to discover success patterns. So, if there is a need for decreasing the number of categories (e.g. if the assumption for Chi Square test is not met), the reduction of categories will be in a way that "successful to very successful" patterns will be in one category. Also, "marginal success" will be in one category and "not successful and not relevant" will be in one category. However, if there is a need for more reduction (2 categories), the "marginal category" will be put under the category of "not successful and not relevant" rather than the category of "successful to very successful".

Table **Error! No text of specified style in document.**.11. Helpfulness of E-Business on supply chain integration

		Frequency	Valid Percent
Valid	not relevant-not helpful	19	29.2
	marginally helpful	19	29.2
	helpful-very helpful	27	41.5
	Total	65	100.0
Missing	System	2	
Total		67	

Table **Error! No text of specified style in document.**.12. Impact of E-Business on supply chain management

		Frequency	Valid Percent
Valid	not relevant-not beneficial-marginally beneficial	38	56.7
	beneficial-very beneficial	29	43.3
	Total	67	100.0

Based on univariate analysis of recoded variables, 41.5% of companies agree that E-Business adoption has been "helpful-very helpful" in improving the integration of supply chains, with 43.3% of companies suggesting that use of E-Business technologies have been "beneficial to very beneficial" to supply chain management.

Univariate analyses of the impact of E-Business on various supply chain processes based on the new recoding can be found in Appendix B.5, Table B.5.1 to Table B.5.14.

The summary of univariate analysis of the impact of E-Business on the improvement of various supply chain processes, after a second round of recoding, is demonstrated in Table 5.

Table **Error! No text of specified style in document.**.13. The summary of the second round of recoded univariate analysis

Supply chain processes	Percentage	
	not relevant-not beneficial-marginally beneficial	beneficial-very beneficial
Impact of E-Business on Customer Relationship Management	43.3	56.7
Impact of E-Business on marketing research	41.8	58.2
Impact of E-Business on management of distribution channels	61.2	38.8
Impact of E-Business on order processing	32.8	67.2
Impact of E-Business on production	44.8	55.2
Impact of E-Business on logistics and returns process	46.3	53.7
Impact of E-Business on product development	67.2	32.8
Impact of E-Business on planning synchronization	46.3	53.7
Impact of E-Business on manufacturing flow management processes	59.7	40.3
Impact of E-Business on lead time management	61.2	38.8
Impact of E-Business on inventory management	46.3	53.7
Impact of E-Business on procurement	41.8	58.2
Impact of E-Business on fulfilment	43.3	56.7
Impact of E-Business on demand	58.2	41.8

management processes		

Univariate analysis of the impact of E-Business adoption on different supply chain processes demonstrates that more than half of SMEs consider this impact more important for order processing (67.2%), marketing (58.2%), procurement (58.2%), customer relationship management (56.7%), fulfilment (56.7%), production (55.2%), inventory management (53.7%), logistics management (53.7%) and planning synchronization (53.7%). On the other hand, the least significant impact was found in product development (32.8%), management of distribution channels (38.8%), lead time management (38.8%), manufacturing flow management process (40.3%) and demand management process (41.8%), with the majority of companies arguing that implementation of information technologies was not relevant and beneficial or marginally beneficial to improvement of recently mentioned variables. Therefore, the implementation of E-Business in supply chain management has been the most important for "order processing", with 67.2% of companies agreeing on that, whereas, it has had the least impact on "product development", with 67.2% of companies believing that the adoption of E-Business has not been very beneficial or had a marginal impact on development of their products.

5.3.2. Bivariate analysis and Hypothesis testing

By carrying out bivariate analysis, the association of variables discussed above is examined. Also, the sparseness of data as well as remarkable patterns can be revealed. Based on the knowledge gained from literature review and the first objective of this research to investigate the impact of electronic supply chain practice on the integration of supply chain processes, the following hypotheses are suggested:

Null hypothesis 1: There is no association between the adoption of electronic supply chain management and integration of supply chains.

Alternative hypothesis 1: A statistically significant association exists between the adoption of electronic supply chain management and integration of supply chains.

Null hypothesis 2: There is no association between the integration of supply chains (resulting from the adoption of E-Business), and the improvement of supply chain processes.

Alternative hypothesis 2: A statistically significant association exists between integration of supply chain and improvement of supply chain processes.

- **Examining Null Hypothesis 1:** There is no association between the adoption of electronic supply chain management and the integration of supply chains.

The following Tables (Tables 5.6-5.8) illustrate the cross tabulations as well as chi-square and significance tests for exploring Null hypothesis (1):

Table **Error! No text of specified style in document.**.14. Impact of E-Business on Supply Chain Management * helpfulness of E-Business on supply chain integration

Crosstab

			helpfulness of E-Business on supply chain integration			Total
			not relevant-not helpful	marginally helpful	helpful-very helpful	
Impact of E-Business on Supply Chain Management	not relevant-not beneficial-marginally beneficial	Count	16	8	12	36
		% within Impact of E-Business on Supply Chain Management	44.4%	22.2%	33.3%	100.0%
	beneficial-very beneficial	Count	3	11	15	29
		% within Impact of E-Business on Supply Chain Management	10.3%	37.9%	51.7%	100.0%
Total		Count	19	19	27	65
		% within Impact of E-Business on Supply Chain Management	29.2%	29.2%	41.5%	100.0%

Table **Error! No text of specified style in document.**.15. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.053[a]	2	.011

Likelihood Ratio	9.820	2	.007
Linear-by-Linear Association	6.292	1	.012
N of Valid Cases	65		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.48.

Table **Error! No text of specified style in document.**.16. Symmetric measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.373	.011
	Cramer's V	.373	.011
N of Valid Cases		65	

As it can be seen from Table 5.6, 51.7% of companies which agreed that adoption of E-Business has been "beneficial to very beneficial" to improvement of their supply chain management, believed that this adoption has been "helpful to very helpful" for the integration of their business processes in the supply chain. This suggests that improvement in the supply chain could be through improving integration of business processes in the supply chain. In order to see if there is significant association between the impact of E-Business on the improvement of supply chain management and the integration of supply chains, the Chi-square test is run (Table 5.7). The Pearson statistic (Table 5.7) shows an Asymp. Sig. (Chi-Square P value) of .011. Since the Chi-Square P value is far less than 5%, it can be concluded that the two variables of "helpfulness of E-Business on supply chain integration" and "Impact of E-Business on supply chain management" are significantly associated ($P=.011<0.05$). So the null hypothesis (1) is rejected. By looking at Cramer's V in Table 5.8, the strength of this association can be identified. Cramer's V for the variables is .373, meaning that the association of "helpfulness of E-Business on supply chain integration" and "Impact of E-Business on supply chain management" has a relative strength of .373.

- ❖ **Examining Null Hypothesis 2:** There is no association between integration of supply chains (resulting from adoption of E-Business) and improvement of supply chain processes.

Since the main aim of this research is to explore the patterns of achievement in E-Business adoption, the bivariate analysis was carried out mainly for the supply chain processes which based on the response of majority of SMEs, E-Business adoption had "beneficial to very beneficial" impact on those processes (Appendix C.5, Tables C.5.1 to Table C.5.27). These main supply chain processes include: order processing (67.2%); marketing (58.2%); procurement (58.2%); customer relationship management (56.7%); fulfilment (56.7%); production (55.2%); inventory management (53.7%); logistics management (53.7%) and planning synchronization (53.7%).

The bivariate analysis of the impact of E-Business on "various supply chain processes" and "supply chain integration" including Cross-tabulation and chi-square tests are summarised in the following Table (Table 5.9).

Table **Error! No text of specified style in document.**.17: Bivariate analysis of impact of E-Business on "various supply chain processes" and "supply chain integration" including Cross-tabulation and chi-square tests

	Helpfulness of E-Business on supply chain integration				
Supply chain processes		not relevant-not helpful	marginally helpful	helpful-very helpful	Chi-Square P value and Cramer's V
Impact of E-Business on customer relationship management	not relevant-not beneficial	40.7%	33.3%	25.9%	P=.079
	beneficial-very beneficial	21.1%	26.3%	52.6%	Cramer's V=.279
Impact of E-Business on marketing research	not relevant-not beneficial	29.6%	25.9%	44.4%	P= .874 Not significant
	beneficial-very beneficial	28.9%	31.6%	39.5%	
Impact of E-Business on order processing	not relevant-not beneficial	52.4%	28.6%	19.0%	P= .009
	beneficial-very beneficial	18.2%	29.5%	52.3%	Cramer's V= .382
Impact of E-Business on production	not relevant-not beneficial	42.9%	28.6%	28.6%	P=.077
	beneficial-very beneficial	18.9%	29.7%	51.4%	Cramer's V=.281
Impact of E-Business on logistics and returns process	not relevant-not beneficial	50.0%	26.7%	23.3%	P=.002
	beneficial-very beneficial	11.4%	31.4%	57.1%	Cramer's V=.444
Impact of E-Business on planning synchronization	not relevant-not beneficial	46.7%	26.7%	26.7%	P=.012
	beneficial-very beneficial	14.3%	31.4%	54.3%	Cramer's V=.370
Impact of E-Business on inventory management	not relevant-not beneficial	41.9%	32.3%	25.8%	P= .030
	beneficial-very beneficial	17.6%	26.5%	55.9%	Cramer's V=.328
Impact of E-Business on procurement	not relevant-not beneficial	48.1%	22.2%	29.6%	P= .018
	beneficial-very beneficial	15.8%	34.2%	50.0%	Cramer's V=.351
Impact of E-Business on fulfilment	not relevant-not beneficial	42.9%	21.4%	35.7%	P=.103
	beneficial-very beneficial	18.9%	35.1%	45.9%	Cramer's V=.265

As it can be seen from Table 5.9, there is a significant association between the "helpfulness of E-Business technologies to supply chain integration" and improvement in the supply chain processes of "logistics and returns process", "order processing", "planning synchronisation", "procurement", "inventory management", "production" and "customer relationship management", with all of them having P value of well below or close to 5%. This association is most strong for "logistics and returns process" (Cramer's V=.444), followed by "order processing", "planning synchronisation", "procurement", "inventory management" and "production" (Cramer's V=.382, .370, .351, .328, .281 and .279, respectively). So, since there were strong associations found between the integration of supply chains (resulting from adoption of E-Business) and improvements in a number of supply chain processes, the null hypothesis (2) is rejected, meaning that E-Business technologies were found to improve various supply chain processes through improving supply chain integration.

The in-depth interpretation of bivariate analysis for each of the supply chain processes and their comparison with the previous literature are discussed below.

- **Customer relationship management (Appendix C.5, Tables C.5.1 to C.5.3)**

As it appears from the cross tabulation of "Impact of E-Business on customer relationship management", 52.6% of companies that believe that E-Business adoption has been "helpful-very helpful" in integration of supply chain business processes, at the same time agree that use of E-Business technologies has improved customer relationship management (as one of the supply chain processes). looking at Chi-square test, it seems that P value (.079) is slightly above 5%, however, because this is so close to being significant (i.e. $p < 0.05$), it still can be concluded that there is a significant association between "helpfulness of E-Business on supply chain integration" and "impact of E-Business on customer relationship management", with a relative strength of .279 (Cramer's V= .279).

Feindt et al. (2002) highlight the significance of interaction and establishing effective customer relationship as one of critical success factors for rapid growth of SMEs engaged in E-Business. Based on the study of Avlonitis and Karayanni

(2000), E-Business contributes to offering value added services to the end customer and improves supplier-customer relationships. Similarly, Giménez and Lourenco (2008) argue that internet technologies enable companies to improve customer relationships, integrate internal business processes and effectively collaborate with different parties in the supply chain.

❖ **Marketing research (Appendix C.5, Tables C.5.4 to C.5.6)**

Having looked at the bivariate analysis of "helpfulness of E-Business on supply chain integration" and "impact of E-Business on marketing research", only 39.5% of companies agree on the "helpful-very helpful" impact of electronic supply chain management on both integration and improvement of marketing research, whereas, more than half of the companies that found E-Business adoption "beneficial-very beneficial" for the marketing research (28.9% and 31.6%), did not find this adoption helpful for the integration of their supply chain processes. The Chi-square test does not reach statistical significance at the 5% level (P=.874>5%), showing that there is not a significant association between the two factors. According to Foley and Ram (2002), E-Business adoption can be mainly used for improvement of a number of areas of business such as marketing in SMEs. It is argued that E-Business technologies allow organisations to bring together general information about "customers, sales, marketing effectiveness, responsiveness and market trends", and enhance marketing research (Koh and Maguire, 2004). Nevertheless, this research did not find a very significant association between improved marketing research and the adoption of E-Business in SCM, suggesting that although the two factors can be interrelated or associated, other factors might influence their association.

❖ **Order processing (Appendix C.5, Tables C.5.7 to C.5.9)**

Based on bivariate analysis of the variables of "helpfulness of E-Business on supply chain integration" and "Impact of E-Business on order processing", it seems that 52.3 % of the companies that have successfully used E-Business in order processing, have admitted the helpfulness of E-Business in the integration of their business processes as well. And 52.4% of companies that believe that E-Business has not been beneficial to order processing, have not found E-Business useful to the integration of their business processes. This highlights the fact that improvements in order processing could be mainly because of improvement in the integration of business processes. The Chi-square test shows a value of .009, which is way less than 5% (P value=.009<5%), and Cramer's V of .382. This validates the very significant and strong association of the variables of "helpfulness of E-Business on supply chain integration" and "impact of E-Business on order processing" (P value=.009<5%, Cramer's V=.382). The study of Johnson and Vitale (1988) support these findings, arguing that some of the advantages of inter-organisational networks include increased efficiency of order processing. Similarly, Koh and Maguire (2004) believe that E-Business technologies enable companies to computerise order processing and to analyse performance in real-time.

- **Production (Appendix C.5, Tables C.5.10 to C.5.12)**

Looking at the variable of "impact of E-Business on production", more than half of the companies (51.4%) agree on the important impact of electronic supply chain adoption on both improving the integration of their business processes and improvement of their production. However, around 30% of companies believed that electronic supply chain adoption has been beneficial to their production while having marginal impact on the integration of their supply chain. A Chi-square value of .077 shows that there is some extent of association between the two variables and the strength of this association is .281 (Cramer's V). This means that the impact of adoption of E-Business on "integration of supply chain" and "production" can be seen to be dependent to each other; however, other factors can influence and undermine this association.

It is believed that, companies can improve the production decision-making process by reducing production cycles. This can happen through high speed of communication and implementing internet-based production planning systems which analyse the production requirements and plans of the different parties in the supply chain (Giménez and Lourenco, 2008). Electronic communication systems such as EDI, which is widely used along with supply chains, allow organisations to reduce the coordinating costs of both economic transactions and production (Malone et al., cited in Cagliano et al., 2005). Similarly, Yin and

Khoo (2007) argue that networked information systems lay the foundation for an efficient material flow network from customer order to production, storage, distribution and delivery. In other words, interrelated digital networks allow companies to integrate the essential elements of their supply chain into competitive production systems (Moodley, 2001).

- **Logistics and returns process (Appendix C.5, Tables C.5.13 to C.5.15)**

Cross tabulation of helpfulness of E-Business on "supply chain integration " and "logistics and returns process" demonstrates that the majority of companies (31.4% and 57.1%) that believed E-Business had a marginal to very significant impact on the integration of their supply chain, had found E-Business technology implementation very useful to the improvement of their logistics and returns process. The Chi-Square P value of .002 is evidence for a significant association between "helpfulness of E-Business on integration of supply chain" and "improvement of logistics and returns process". Moreover, the association between the two variables seems to be very strong (Cramer's V=.444). Based on the study of Moodley (2001), having more efficient logistics is one of the main benefits of internet technologies. It is argued that the internet can have a significant impact on the reverse logistics and returns process by providing enhanced knowledge and data to all parties of the supply chain involved in this process (Giménez and Lourenco, 2008).

- **Planning synchronisation (Appendix C.5, Tables C.5.16 to C.5.18)**

For the variables of "helpfulness of E-Business on supply chain integration" and "impact of E-Business on planning synchronisation", 54.3% of the companies that found use of E-Business technologies "helpful-very helpful" on integration of their operations, agreed on significant impact of these technologies on improvement of planning synchronisation in their supply chain. And, only 26.7% of companies accepting the importance of E-Business on integration rejected the usefulness of these technologies on improving their planning synchronisation. Chi-Square value and Cramer's V show a significant and strong association between the two variables, meaning that "impact of E-Business adoption on integration of supply chain" and "improvements in planning synchronisation" are significantly dependent to each other (P=.012<.05, Cramer's V=.370). It is argued that E-Business coordination applications enable the planning and evaluation of supply chain processes and business operations (Zhu and Kraemer, 2002; Barua et al., 2004). Coordinated planning and business operations within supply chain activities provide better access to information, enhance efficient management and decrease non-value added activities, contributing to improved performance (Germain and Iyer, 2006; Rodrigues et al., 2004). It is believed that the internet enables the supply chain partners to have access to knowledge sharing systems such as data analysis and modelling, which allows enhanced planning and decision making (Swaminathan and Tayur, 2003). In the same way, Giménez and Lourenco (2008) believe that the internet and web-based technologies can provide companies with the benefit of improved forecasting and planning through enhancing collaboration with supply chain parties.

❖ **Inventory management (Appendix C.5, Tables C.5.19 to C.5.21)**

The bivariate analysis and Chi-square test of "helpfulness of E-Business on supply chain integration" and "impact of E-Business on inventory management", demonstrates that a statistically significant and relatively strong association exists between the two variables (P=.030<.05, Cramer's V=.328). 55.9% of the companies were in agreement about the simultaneous helpfulness of E-Business on "integration of supply chain processes" and "inventory management". And only 17.6% of companies disagreed on the helpful impact of electronic supply chains on supply chain integration, while admitting its benefit on inventory management. It is argued that integrated networks supported by E-Business infrastructures allow companies to benefit from reduced total cost and reduced inventory levels as well as improved customer service (Ho, 2009; Vakharia, 2002; Muffatto and Payaro, 2004). IT analytical tools allow companies to anticipate changes in customers' demand and improve their responsiveness. These tools assist companies at the operational and strategic level to analyse customer orders, obtain the optimal inventory and design efficient supply network (Giménez and Lourenco, 2008). Iyer (2011) contends that operational improvements resulting from adoption of E-business technologies contribute to top-line and bottom-line financial performance gains such as improved customer delivery reliability and inventory turnover rates.

- **Procurement (Appendix C.5, Tables C.5.22 to C.5.24)**

Based on the bivariate analysis of "helpfulness of E-Business on supply chain integration" and "Impact of E-Business on procurement", half of the companies that believed that implementation of electronic supply chain practice was "beneficial to very beneficial" to their procurement, agreed on helpfulness of E-Business on integration of their supply chain as well. And only, 29.6% of companies did not find E-Business implementation useful or relevant to improving their procurement despite admitting the importance of E-Business on integration of their business processes. However, Chi-Square value and Cramer's V show that there is a significant association and strong connection between the impact of E-Business on "integration of supply chain" and "procurement" (P=.018<.05, Cramer's V=.351). The study of Giménez and Lourenco (2008) confirms the importance of internet and web-based technologies in improving the efficiency of the procurement process.

- **Fulfilment (Appendix C.5, Tables C.5.25 to C.5.27)**

Looking at the variables of "helpfulness of E-Business on supply chain integration" and "impact of E-Business on fulfilment", the majority of companies (35.1% and 45.9%) seem to have accepted the helpful impact of E-Business on fulfilment, while agreeing to some extent on the impact of E-Business on the integration of their business processes. However, based on Chi-Square value (P= .103), this association does not seem to be very significant.

5.3.3. Logistic Regression

Logistic regression refers to a mathematical modelling approach that is applied to explain the relationship of several Independent Variables (IVs) to a binomial (dichotomous) Dependent Variable (DV). This kind of analysis is mainly used for investigating hypothetical research problems in which a set of IVs are related to consider a multivariable problem. To evaluate the degree to which an IV (e.g. smoking) is associated with a DV (e.g. a disease), often other IVs are taken into account or "controlled for" (e.g. age, race, etc.) (Kleinbaum and Klein, 2010). As mentioned, logistic regression is used when the DV is categorical and has only two categories (values), which should be coded '1' or '0'. The regression model focuses on predicting if cases score a '1' in the DV. In other words, the model attempts to discover the '1's above 5% and below 95% of sample (Menard, 2002). Using Logistic regression enables simultaneous consideration of IVs in a multivariate way rather than as a collection of bivariate links. In this research regression analysis will be mainly used for identification of impact of variation in various IVs on variation of DV.

The IV of impact of E-Business on supply chain management together with other IVs (a variety of supply chain processes) is used to explain the dependent variable (supply chain integration). Since the DV should be binomial, it is recoded to 2 categories of "not relevant-not helpful-marginally helpful" and "helpful-very helpful". The univariate analysis of DV after the second recoding of data mentioned earlier is as follows:

Table **Error! No text of specified style in document.**.18. Helpfulness of E-Business on value chain integration

		Frequency	Percent	Valid Percent
Valid	not relevant-not helpful-marginally helpful	38	56.7	58.5
	helpful-very helpful	27	40.3	41.5
	Total	65	97.0	100.0
Missing	System	2	3.0	
Total		67	100.0	

5.3.4. Logistic Regression outputs

Having run the logistic regression tests, Tables 5.11, 5.12 and 5.13 were created. The interpretation of the Tables is discussed below.

Table **Error! No text of specified style in document.**.19. Case processing summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	65	97.0
	Missing Cases	2	3.0
	Total	67	100.0
Unselected Cases		0	.0
Total		67	100.0

a. If weight is in effect, see classification Table for the total number of cases.

Table **Error! No text of specified style in document.**.20. Dependent variable encoding

Original Value	Internal Value
not relevant-not helpful-marginally helpful	0
helpful-very helpful	1

Table 5.11 provides details on total missing values for the model, in this case there are only 2 missing values. Dummy variables are used to sort data into two mutually exclusives categories. Table 5.12 illustrates that the dummy variable is "helpful to very helpful" impact of E-Business on supply chain integration in contrast to "not relevant-not helpful-marginally helpful" impact, which is considered as a reference group.

Table **Error! No text of specified style in document.**.21. Categorical variables coding

		Frequency	Parameter coding
			(1)
Impact of E-Business on fulfilment	not relevant-not beneficial-marginally beneficial	28	.000
	beneficial-very beneficial	37	1.000
Impact of E-Business on order processing	not relevant-not beneficial-marginally beneficial	21	.000
	beneficial-very beneficial	44	1.000
Impact of E-Business on production	not relevant-not beneficial-marginally beneficial	28	.000
	beneficial-very beneficial	37	1.000
Impact of E-Business on logistics and returns process	not relevant-not beneficial-marginally beneficial	30	.000
	beneficial-very beneficial	35	1.000
Impact of E-Business on planning synchronization	not relevant-not beneficial-marginally beneficial	30	.000
	beneficial-very beneficial	35	1.000
Impact of E-Business on procurement	not relevant-not beneficial-marginally beneficial	27	.000
	beneficial-very beneficial	38	1.000
Impact of E-Business on inventory management	not relevant-not beneficial-marginally beneficial	31	.000
	beneficial-very beneficial	34	1.000
Impact of E-Business on Customer Relationship Management	not relevant-not beneficial-marginally beneficial	27	.000
	beneficial-very beneficial	38	1.000

The encoding of dependent and categorical variables illustrates how the outcome (or dependent) and categorical dummy variables have been coded.

Here, IV dummy variable identifies companies in which E-Business has had a "beneficial to very beneficial" impact in terms of improvement of their various supply chain processes" (categories with value 1) (Table 5.13). So, companies that E-Business was "not relevant or beneficial or was only marginally beneficial" are not identified (coded as 0) and are hence treated as a reference group. This means that in the model the IV dummy variable will be illustrating the "beneficial to very beneficial" effect of E-Business compared with "not relevant-not beneficial-marginally beneficial impact" on supply chain integration (DV).

For a quantitative model to be valid, it needs to account for a significant proportion of the Total Log-Likelihood (TLL), which is the measure of total variation available in the model. Iteration history (Table 5.14) provides the log-likelihood.

TLL (The total variation available) =88.239

Table **Error! No text of specified style in document.**.22. Iteration history[a,b,c]

Iteration		-2 Log likelihood
Step 0	1	88.239
	2	88.239
	3	88.239

Table **Error! No text of specified style in document.**.23.Omnibus tests of model coefficients

		Chi-square	Sig.
Step 1	Step	17.008	.030
	Block	17.008	.030
	Model	17.008	.030

Table 5.15 provides the Model Log-Likelihood (MLL), which shows how much of the log likelihood is accounted for in the model and how much is left unexplained. The pseudo R-Square is calculated by dividing the model log-likelihood by the total log-likelihood, which is interpreted as the proportion of variation in the DV that is accounted for in the model, which is .19. So, the variation in different levels of IV (impact of E-Business in various supply chain

processes) accounts for 19% of variation in overall supply chain integration (see below).

MLL (The variation accounted for in the model) =17.008

Pseudo R-Square=MLL/TLL=17.008/88.239= .19

5.4. Data Analysis part 2: Data Analysis for discovering barriers of successful adoption of E-Business technologies

Univariate and bivariate analysis of barriers of successful adoption of E-Business technologies is discussed in the following section.

5.4.1. Univariate analysis of DV

Univariate analysis of DV (the level of success of companies in E-supply chain adoption) before recoding and after second round of recoding is shown in Tables 5.16, 5.17 and 5.18.

Table **Error! No text of specified style in document.**.16. Success of the company in implementation of the E-Business before recoding

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid very successful	5	7.5	7.5	7.5
successful	30	44.8	44.8	52.2
partially successful	31	46.3	46.3	98.5
Failure	1	1.5	1.5	100.0
Total	67	100.0	100.0	

Table **Error! No text of specified style in document.**.17. Success of the company in implementation of the E-Business after first recoding

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid very successful-successful	35	52.2	52.2	52.2
partially successful	31	46.3	46.3	98.5
Failure	1	1.5	1.5	100.0
Total	67	100.0	100.0	

Table **Error! No text of specified style in document.**.18. Success of the company in implementation of the E-Business after second recoding

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	very successful-successful	35	52.2	52.2	52.2
	partially successful-failure	32	47.8	47.8	100.0
	Total	67	100.0	100.0	

The univariate analysis of "level of success of companies in E-supply chain adoption" demonstrates the fact that large percentages of companies have been successful in the adoption of E-Business, with 52.2 % of companies "successfully-very successfully" adopting E-Business in their supply chain processes. Only 1.5 % reported that they had faced failure in their accomplishment.

5.4.2. Univariate analysis of IVs

Univariate analysis of various IVs (Barriers of electronic supply chain adoption) after recoding ("not a constraint" is classified in the category of "not relevant") is illustrated in Appendix D.5, Table D.5.1 to D.5.13.

The Summary of Univariate analysis in terms of valid percentage of frequencies, which is the percentage after consideration of missing values, is summarized in the following Table (Table 5.19).

Table **Error! No text of specified style in document.**.19. Summary of Univariate analysis

Barriers of electronic supply chain adoption	Valid Percentage %		
	not relevant-not a constraint	moderate constraint	strong constraint
The barrier of security and privacy concerns	38.8	37.3	23.9
The barrier of being unaware of the potential of ICTs	43.3	29.9	26.9
The barrier of low supplier E-Business use	42.4	27.3	30.3
The barrier of high cost of networking technologies	40.3	31.3	28.4
The barrier of lack of IT knowledge and skills	40.3	40.3	19.4
The barrier of high operation costs of ICT	49.3	41.8	9.0
The barrier of high costs of research in the area of IT	46.3	44.8	9.0
The barrier of being unconvinced of the benefits of E-Business	62.1	28.8	9.1
The barrier of conducting business in defined niche markets	60.6	21.2	18.2
The barrier of unreliable and inconsistent network	71.6	19.4	9.0
The barrier of limited network bandwidth	68.7	19.4	11.9

The barrier of difficulty and high costs of outsourcing IT activities	61.2	23.9	14.9
The barrier of lack of personnel to implement ICT	46.3	40.3	13.4

Based on the Univariate analysis of barriers, it seems that the strong constraint comes from "low supplier E-Business use" with 30.3% of companies identifying it as the most significant barrier in the adoption of E-Business. The other important barriers include "high cost of networking technologies" and "being unaware of the potential of ICTs" (28.4% and 26.9%, respectively), followed by "the barrier of security and privacy concerns" (23.9 %) and "lack of IT knowledge and skills" (19.4%). On the other hand, the least significant obstacles include "unreliable and inconsistent network", "high costs of research in the area of IT", "high operation costs of ICT" and "being unconvinced of the benefits of E-Business", with only about 9% of companies considering them as preventing adoption of E-Business technologies (9% for each barrier).

5.4.3. Bivariate analysis after recoding

Bivariate analysis of the variables was conducted based on examining null hypothesis 3;

Null hypothesis 3: There is no association between barriers of E-Business adoption and successful implementation of electronic supply chain management.

Alternative hypothesis 3: A statistically significant association exists between barriers of E-Business adoption and successful implementation of electronic supply chain management.

- **Examining Null Hypothesis 3:**

The crosstabs as well as Chi-square and significance tests for exploring null hypothesis (3) are illustrated in Appendix E.5., Tables E.5.1 to E.5.40.

As it can be seen from the Tables in the Appendix E.5, Chi-square test assumption was not met for some of the variables (the expected value of each cell should be 5 or more, in other words, 20% of most cells can have an expected value of less than 5), so the recoding was continued to see if this problem could be eliminated or decreased. This time, the "moderate constraint" went under the first category "not relevant-not a constraint ", putting more emphasis on analysis of "strong constraint". The Bivariate analysis after the second recoding is illustrated in Appendix F.5, Tables F.5.1 to F.5.39. The main results of bivariate hypothesis testing analysis are summarised in Table 5.20.

Table **Error! No text of specified style in document.**.20. Summary of bivariate hypothesis testing analysis

	Success of the company in implementation of the E-Business			
Barriers		very successful-successful	partially successful-failure	Chi-Square P value and Cramer's V
The barrier of security and privacy concerns	not relevant-not a constraint-moderate constraint	51.0%	49.0%	P=.713 Cramer's V=.045
	strong constraint	56.2%	43.8%	(Not significant)
The barrier of being unaware of the potential of ICTs	not relevant-not a constraint-moderate constraint	61.2%	38.8%	P= .015 Cramer's V=.297
	strong constraint	27.8%	72.2%	
The barrier of low supplier E-Business use	not relevant-not a constraint-moderate constraint	63.0%	37.0%	P= .013 Cramer's V=.304
	strong constraint	30.0%	70.0%	
The barrier of high cost of networking technologies	not relevant-not a constraint-moderate constraint	52.1%	47.9%	P=.968 Cramer's V=.005
	strong constraint	52.6%	47.4%	(Not significant)
The barrier of lack of IT knowledge and skills	not relevant-not a constraint-moderate constraint	59.3%	40.7%	P=.019 Cramer's V=.286
	strong constraint	23.1%	76.9%	
The barrier of high operation costs of ICT	not relevant-not a constraint-moderate constraint	52.5%	47.5%	N/A
	strong constraint	50.0%	50.0%	
The barrier of high	not relevant-not a	55.7%	44.3%	N/A

costs of research in the area of IT	constraint-moderate constraint			
	strong constraint	16.7%	83.3%	
The barrier of being unconvinced of the benefits of E-Business	not relevant-not a constraint-moderate constraint	58.3%	41.7%	N/A
	strong constraint	0.0%	100.0%	
The barrier of conducting business in defined niche markets	not relevant-not a constraint-moderate constraint	57.4%	42.6%	P=.042 Cramer's V=.250
	strong constraint	25.0%	75.0%	
The barrier of lack of personnel to implement ICT	not relevant-not a constraint-moderate constraint	54.2%	45.8%	N/A
	strong constraint	37.5%	62.5%	
Barriers		very successful-successful	partially successful-failure	Chi-Square P value and Cramer's V
The barrier of limited network bandwidth	not relevant-not a constraint-moderate constraint	52.5%	47.5%	N/A
	strong constraint	50.0%	50.0%	
The barrier of difficulty and high costs of outsourcing IT activities	not relevant-not a constraint-moderate constraint	56.1%	43.9%	N/A
	strong constraint	30.0%	70.0%	
The barrier of unreliable and inconsistent network	not relevant-not a constraint-moderate constraint	55.2%	44.8%	N/A
	strong constraint	33.3%	70.0%	

After the second coding still some of the variables did not meet the Chi-Square assumption, so, bivariate analysis was not applicable for those factors (N/A). Since the recoding is not possible anymore (there are only two categories left), the results of bivariate are interpreted only for valid tests. One of the interesting patterns is that all the companies (100%) in sample that experienced failure or partial success found "being unconvinced of the benefits of E-Business" as the strongest barrier in adoption of E-Business technologies. Similarly, more than half of the companies that reported that adoption of E-Business has not been successful, agreed on the significance of barriers of "high costs of research in the area of IT" (83.3%), "lack of IT knowledge and skills" (76.9%), "conducting business in defined niche markets" (75%), "being unaware of the potential of

ICTs" (72.2%), "low supplier E-Business use" (70.0%), "difficulty and high costs of outsourcing IT activities" (70.0%), "unreliable and inconsistent network" (70.0%), and "lack of personnel to implement ICT" (62.5%). However, for companies that implemented E-Business technologies successfully, these barriers were moderate. For the successful companies, the main barriers included "security and privacy concerns", "high cost of networking technologies", "limited network bandwidth" and "high operation costs of ICT" with around half of the successful companies considering these barriers as strong constraints.

The Chi-Square P value demonstrates that there is a significant association between the level of success of E-Business technologies and the strength of the following barriers: "low supplier E-Business use"; "being unaware of the potential of ICTs"; "lack of IT knowledge and skills" and "conducting business in defined niche markets", with all of them having P value less than 5% (.013, .015, .019, .042, respectively). The Cramer's V shows that this association is the most strong for "low supplier E-Business use" (Cramer's V=304), followed by "being unaware of the potential of ICTs", "lack of IT knowledge and skills" and "conducting business in defined niche markets" (Cramer's V=.297, .286, .250, respectively).

Data demonstrates that bivariate hypothesis testing analysis is not applicable (N/A) for most of the variables since the Chi Square assumption is not met for them. Considering the fact that a significant association was found between "barriers of E-Business adoption" and "level of success in implementation of electronic supply chain management", the null hypothesis (3) is rejected. As a result, perceived barriers associated with the implementation of information technology in supply chain management can influence the successful adoption of E-Business technologies.

The findings of this research about barriers influencing acceptance of E-Business are consistent with the study of Dixon et al. (2002). The barriers of "being unaware of the potential of ICTs", "lack of IT knowledge and skills" and "conducting business in defined niche markets", which were found to have strong association with level of success of E-Business adoption (P= .015, Cramer's V=.297, P=.019, Cramer's V=.286, P=.042, Cramer's V=.250, respectively) are amongst the seven forms of E-Business adoption barrier for

SMEs suggested by Dixon et al. (2002). Similarly, Ifinedo (2011) argues that perceived benefits of E-Business adoption in terms of potential of ICTs influence the adoption of internet technologies in SMEs. Moreover, Kohli and Grover (2008) and Wiengarten et al. (2011) highlight the importance of integrating a firm's E-Business systems with its supplier E-Business systems, certifying the impact of "low supplier E-Business use" on adoption of E-Business technologies (P= .013, Cramer's V=.304).

5.4.4. Logistic Regression

Logistic Regression for barriers of adoption of E-Business technologies is illustrated in Tables 5.21, 5.22 and 5.23.

Table **Error! No text of specified style in document.**.21. Case processing summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	65	97.0
	Missing Cases	2	3.0
	Total	67	100.0
Unselected Cases		0	.0
Total		67	100.0

a. If weight is in effect, see classification Table for the total number of cases.

Table **Error! No text of specified style in document.**.22. Dependent variable encoding

Original Value	Internal Value
partially successful-failure	0
successful-very successful	1

Table **Error! No text of specified style in document.**.23. Categorical variables codings

Categorical Variables Codings		Frequency	Parameter coding
			(1)
The barrier of lack of personnel to implement ICT	not relevant-not a constraint-moderate constraint	57	.000
	strong constraint	8	1.000
The barrier of being unaware of the potential of ICTs	not relevant-not a constraint-moderate constraint	48	.000
	strong constraint	17	1.000
The barrier of low supplier E-Business use	not relevant-not a constraint-moderate constraint	45	.000
	strong constraint	20	1.000
The barrier of high cost of networking technologies	not relevant-not a constraint-moderate constraint	47	.000
	strong constraint	18	1.000
The barrier of high cost of networking technologies	not relevant-not a constraint-moderate constraint	53	.000
	strong constraint	12	1.000
The barrier of high operation costs of ICT	not relevant-not a constraint-moderate constraint	60	.000
	strong constraint	5	1.000
The barrier of high costs of research in the area of IT	not relevant-not a constraint-moderate constraint	59	.000
	strong constraint	6	1.000
The barrier of being unconvinced of the benefits of E-Business	not relevant-not a constraint-moderate constraint	59	.000
	strong constraint	6	1.000
The barrier of difficulty and high costs of outsourcing IT activities	not relevant-not a constraint-moderate constraint	56	.000
	strong constraint	9	1.000

The barrier of unreliable and inconsistent network	not relevant-not a constraint-moderate constraint	60	.000
	strong constraint	5	1.000
The barrier of limited network bandwidth	not relevant-not a constraint-moderate constraint	58	.000
	strong constraint	7	1.000
The barrier of conducting business in defined niche markets	not relevant-not a constraint-moderate constraint	53	.000
	strong constraint	12	1.000
The barrier of security and privacy concerns	not relevant-not a constraint-moderate constraint	50	.000
	strong constraint	15	1.000

The dummy variable in Table 5.22 is "very successful-successful" adoption of E-Business technologies. IV dummy variable in Table 5.23 identifies barriers that have been "strong constraint" (categories with value 1) for the companies. So, companies that the barriers of adoption of E-Business was "not relevant-not a constraint-moderate constraint" are not identified and are hence presented as a reference group. So, in the model the IV dummy variable will be illustrating the impact of barriers in the category of "strong constraint" on "successful to very successful" adoption of E-Business technologies (DV).

Tables 5.24 and 5.25 provide total log-likelihood and model log-likelihood, and the pseudo R-Square can be calculated, which demonstrates the proportion of variation in the DV that is accounted for in the model;

TLL = 89.971

MLL= 31.968

Pseudo R-Square=MLL/TLL=31.968/ 89.971= .35

So, the variation in different levels of barriers of adoption of E-Business technologies account for 35% of variation in successful E-Business adoption.

Table **Error! No text of specified style in document.**.24. Iteration history[a,b,c]

Iteration		-2 Log likelihood
Step 0	1	89.971
	2	89.971

Table **Error! No text of specified style in document.**.25. Omnibus tests of model coefficients

		Chi-square	Sig.
Step 1	Step	31.968	.002
	Block	31.968	.002
	Model	31.968	.002

5.5. Data analysis part 3: Data Analysis for discovering benefits of successful adoption of E-Business technologies

Univariate and bivariate analyses for discovering benefits of successful adoption of E-Business technologies are discussed in the following section.

5.5.1. Univariate analysis of benefits of successful adoption of E-Business technologies (Frequency Tables)

Univariate analysis of the benefits of E-Business is illustrated in Appendix G.5, Tables G.5.1 to G.5.20.

Based on Univariate analysis of benefits resulting from adoption of E-Business, E-Business technologies are "very beneficial" mainly for "improved information sharing" with 31.3% of companies agreeing on significant impact of E-Business on improving information exchange between different parts of supply chain. The other main impact of E-Business can be seen on "improved customer service", "enhanced customer satisfaction" and "expanded market share", with respectively 26.9%, 25.4% and 22.4% of companies acknowledging the improvement of mentioned variables. However, it seems that the least impact has been on "production cycle time", which only 4.5% of companies found information technology useful for decreasing their production life cycle time.

5.5.2. Univariate analysis after recoding

Univariate analysis of benefits of E-Business after recoding is illustrated in Appendix H.5, Tables H.5.1 to H.5.11. The summary of percentages of frequency Tables is presented in Table 5.26.

Table **Error! No text of specified style in document.**.26. Summary of percentages of frequency Tables

	Frequency (Valid percentage %)		
E-Business benefits	not relevant-not beneficial	marginally beneficial	beneficial-very beneficial
Improved customer service	9.0	16.4	74.6
Enhanced customer satisfaction	7.5	25.4	67.2
Enhanced competitive advantage	17.9	26.9	55.2
Creating interactive relationships with customers	17.9	25.4	56.7
Creating interactive relationships with suppliers	29.9	35.8	34.3
Improved information sharing	13.4	20.9	65.7
Improved supply chain management	17.9	34.3	47.8
Expanded market share	23.9	28.4	47.8
Improved planning	26.9	28.4	44.8
Improved product flow management	19.4	32.8	47.8
Improved forecasting and planning	22.7	28.8	48.5

After recoding and creating 3 new categories of "not relevant-not beneficial", "marginally beneficial" and "beneficial-very beneficial", it seems that applying E-Business technologies has a "beneficial to very beneficial" impact largely on "customer service", "customer satisfaction", "information sharing", "relationships with customers" and "enhanced competitive advantage" (74.6%, 67.2%, 65.7%, 56.7% and 55.2% respectively) with more than half of the companies arguing that these functions have improved considerably, using E-Business in conducting their business processes. The interesting issue is that most of these variables are related to customer and customer satisfaction, highlighting the importance of E-business on customer relationship management. On the other hand, data demonstrates that the least impact of information technology is on "creating interactive relationships with suppliers" with only 34.3% of companies finding it helpful in the improvement of their relationship with customers.

5.5.3. Bivariate analysis after recoding

Bivariate analysis of the benefits of adoption of ESCM is done based on examining null hypothesis 4.

Null hypothesis 4: There is no association between perceived benefits of adoption of E-Business technologies and successful adoption of electronic supply chain management.

Alternative hypothesis 4: A statistically significant association exists between perceived benefits of adoption of E-Business technologies and successful adoption of electronic supply chain management.

- **Examining null hypotesis 4**

Tables I.5.1 to I.5.33 in Appendix I.5 illustrate the crosstabs as well as chi-square and significance tests for exploring null hypothesis 4.

As it can been seen from the bivariate analysis based on the recent recoding, the Chi-Square test assumption is not met for any of the above analysed variables (more than 20% have expected count less than 5), which requires another recoding, in which the categories of IV and DV are decreased into 2 total categories each. So, in the new recoding, DV (success of the company in implementation of the E-Business) will have 2 categories of "partially successful-failure" and "successful-vary successful", and IV (E-Business benefits) will have 2 categories of "not relevant-not beneficial-marginally beneficial" and "beneficial-very beneficial". The reason that the category of "marginally beneficial" goes under the first category rather that the last one (beneficial-very beneficial), is that the focus of this research is to discover success and high achievement patterns, so the main categories which relate to categories of "very successful-successful" adoption of E-Business and "beneficial-very beneficial" impact of E-Business are left untouched.

5.5.4. Univariate and bivariate analysis after final recording

The final recording of "benefits of E-Business adoption" and "success of the company in implementation of the E-Business" can be found in Appendix J.5, Tables J.5.1 to J.5.11. Also, bivariate analysis of "success of the company in implementation of the E-Business" and various "benefits resulted from the adoption of E-Business technologies" is illustrated in Appendix K.5, Tables K.5.1 to K.5.33.

The main results of bivariate hypothesis testing analysis of "success of the company in implementation of the E-Business" and "benefits of E-Business adoption" are summarised in Table 5.27.

Table **Error! No text of specified style in document.**.27. Main results of bivariate hypothesis testing analysis of "success of the company in implementation of the E-Business" and "benefits of E-Business adoption"

	Success of the company in implementation of the E-Business			
Benefits		very successful-successful	partially successful-failure	Chi-Square P value and Cramer's V
Improved customer service	not relevant-not beneficial-marginally beneficial	47.1%	52.9%	P=.621 Cramer's V=.060
	beneficial-very beneficial	54.0%	46.0%	
Enhanced customer satisfaction	not relevant-not beneficial-marginally beneficial	50.0%	50.0%	P= .798 Cramer's V=.031
	beneficial-very beneficial	53.3%	46.7%	
Enhanced competitive	not relevant-not beneficial-	40.0%	60.0%	P= .071 Cramer's V=.221

advantage	marginally beneficial			
	beneficial-very beneficial	62.2%	37.8%	
Creating interactive relationships with suppliers	not relevant-not beneficial-marginally beneficial	50.0%	50.0%	P=.612 Cramer's V=.062
	beneficial-very beneficial	56.5%	43.5%	
Creating interactive relationships with customers	not relevant-not beneficial-marginally beneficial	41.4%	58.6%	P=.120 Cramer's V=.190
	beneficial-very beneficial	60.5%	39.5%	
Improved information sharing	not relevant-not beneficial-marginally beneficial	26.1%	73.9%	P=.002 Cramer's V=.379
	beneficial-very beneficial	65.9%	34.1%	
Benefits		very successful-successful	partially successful-failure	Chi-Square P value and Cramer's V
Improved supply chain management	not relevant-not beneficial-marginally beneficial	34.3%	65.7%	P=.002 Cramer's V=.376
	beneficial-very beneficial	71.9%	28.1%	
Expanded market share	not relevant-not beneficial-marginally beneficial	53.1%	48.6%	P=.890 Cramer's V=.017
	beneficial-very beneficial	51.4%	46.9%	
Improved planning	not relevant-not beneficial-marginally beneficial	40.5%	59.5%	P=.033 Cramer's V=.260
	beneficial-very beneficial	66.7%	33.3%	
Improved product flow management	not relevant-not beneficial-marginally beneficial	40.0%	60.0%	P= .036 Cramer's V=.256
	beneficial-very beneficial	65.6%	34.4%	
Improved forecasting and planning	not relevant-not beneficial-marginally beneficial	44.1%	55.9%	P= .215 Cramer's V=.153
	beneficial-very beneficial	59.4%	40.6%	

Table 5.27 shows that there is a very significant association between the "level of success of companies" and the achieved benefits of "improved supply chain

management" and "improved information sharing", with both of them having P value less than 5% (P=.002). Cramer's V for both of the variables shows a very strong association. The strength of this association is, however, slightly more for "improved information sharing" (Cramer's V of improved information sharing =.379, Cramer's V of improved supply chain management =.376), showing that adoption of E-Business technologies is slightly more beneficial for enabling efficient information exchange. Looking at the percentages of the 2 discussed variables, it is noticed that more than half of the companies that have adopted E-Business technologies "successfully to very successfully", believe that this adoption has been "beneficial to very beneficial" to improvement of their "information sharing" (65.9%) and "supply chain management" (71.9%). Similarly, a significant relationship is found between the "successful adoption of E-Business technologies" and attained benefits of "improved planning", "improved product flow management" and "enhanced competitive advantage" (P=.033, Cramer's V=.260; P= .036, Cramer's V=.256, and P= .07, Cramer's V=.221, respectively), with E-Business adoption having most impact on improved planning.

The least significant impact is found for the benefit of "expanded market share (P value= .890), where there is little variation between categories of "level of success in adoption of E-Business technologies". As it can be seen, 51.4% of companies that have been successful in applying E-Business argue that this adoption has been very beneficial to increasing their market share, however, 53.1% of the companies that have successfully implemented information technologies did not find this accomplishment very useful to increasing their market share. This, somehow, creates contradiction and uncertainty in the main nature of the impact of adoption of E-Business in variable of "expanded market share".

Having investigated the bivariate analysis of "success of the company in implementation of the E-Business" and "perceived benefits of E-Business adoption", there is evidence of a statistically significant association between a few of the perceived benefits and successful adoption and implementation of electronic supply chain management. So the null hypothesis (4) is rejected. This means a statistically significant association exists between perceived benefits of adoption of E-Business technologies and successful adoption of electronic supply chain management.

The result of this study is in agreement with the study of Ho (2009) and Damanpour (2001). They argue that some of the significant benefits of E-Business in SCM include better integration of supply chain parties, improved communications and management of information. Similarly, based on the result of this research study, improved information sharing has strong association with successful adoption of E-Business technologies (P=.002, Cramer's V=.379). Giannakis and Croom (2004) and Moodley (2001) argue that E-Business has a significant impact on supply chain structures and coordination, which results in improved supply chain management. This is consistent with the result of this research (improved supply chain management, P=.002, Cramer's V=.376).

Moreover, according to Lee and Whang (2001) and Giménez and Lourenco (2008), internet and web-based technologies provide companies with benefits of improved forecasting and planning synchronisation through collaboration with business partners as well as workflow coordination and efficient product flow management. Moreover, they emphasise the enhanced competitive advantage resulted from improved customer satisfaction. The findings of this research verifies the previously mentioned studies, with "improved planning", "improved product flow management" and "enhanced competitive advantage" having significant impact on adoption of E-Business in supply chain management (P=.033, Cramer's V=.260, P= .036, Cramer's V=.256, P= .071, Cramer's V=.221, respectively).

5.5.5. Logistic Regression

Logistic Regression for the main benefits of adoption of E-Business technologies is illustrated in Tables 5.28 to 5.30.

Table **Error! No text of specified style in document.**.28. Case processing summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	67	100.0
	Missing Cases	0	.0
	Total	67	100.0
Unselected Cases		0	.0

Total	67	100.0

a. If weight is in effect, see classification Table for the total number of cases.

Table **Error! No text of specified style in document.**.29. Dependent Variable Encoding

Original Value	Internal Value
partially successful-failure	0
very successful-successful	1

Table 5.30 demonstrates that there are no missing cases, and, Table 5.31 shows that the dummy variable is "very successful-successful" adoption of E-Business technologies in contrast to "marginally successful-failure "adoption, which is considered as a reference group.

Table **Error! No text of specified style in document.**.30. Categorical variables codings

		Frequency	Parameter coding
			(1)
E-Business benefit of improved information sharing	not relevant-not beneficial-marginally beneficial	23	.000
	beneficial-very beneficial	44	1.000
E-Business benefit of improved planning	not relevant-not beneficial-marginally beneficial	37	.000
	beneficial-very beneficial	30	1.000
E-Business benefit of improved product flow management	not relevant-not beneficial-marginally beneficial	35	.000
	beneficial-very beneficial	32	1.000
E-Business benefit of enhanced competitive advantage	not relevant-not beneficial-marginally beneficial	30	.000
	beneficial-very beneficial	37	1.000
E-Business benefit of improved supply chain management	not relevant-not beneficial-marginally beneficial	35	.000
	beneficial-very beneficial	32	1.000

The IV dummy variable in Table 5.32 identifies companies that E-Business has had "beneficial to very beneficial" impact on achieving various benefits (categories with value 1). So, companies reporting that adoption of E-Business was "not relevant or beneficial or was only marginally beneficial" are not identified (coded as 0) and are hence a reference group, meaning that in the model the IV dummy variable will be illustrating the "beneficial to very beneficial" effect of E-Business technologies compared with "not relevant-not beneficial-marginally beneficial" of this effect on "successful to very successful adoption of E-Business technologies" (DV).

The Table of Iteration history (Table 5.31) provides the log-likelihood, showing the total variation available. And Table 5.32 gives the model log-likelihood (the extent of the log likelihood accounted for in the model). Having identified this information, the pseudo R-Square is calculated, which demonstrates the proportion of variation in the DV that is accounted for in the model.

TLL (Total log likelihood) = 92.747

MLL (The variation accounted for in the model) = (MLL=16.277)

Pseudo R-Square=MLL/TLL=16.277/ 92.747= .175

So, the variation in different levels of IV (benefits achieved from adoption of E-Business technologies) account for almost 17% of variation in successful E-Business adoption.

Table **Error! No text of specified style in document.**.31. Iteration History[a,b,c]

Iteration		-2 Log likelihood
Step 0	1	92.747
	2	92.747

Table **Error! No text of specified style in document.**.32. Omnibus tests of model coefficients

		Chi-square	Sig.
Step 1	Step	16.277	.006
	Block	16.277	.006
	Model	16.277	.006

5.6. Data analysis part 4: Data analysis for identifying environmental factors influencing successful adoption of E-Business technologies

Univariate and bivariate analyses for identifying environmental factors influencing successful adoption of E-Business technologies are discussed in the following section.

5.6.1. Univariate analysis

Univariate analysis (Frequency Tables) of the impact of environmental factors on E-Business adoption is illustrated in Appendix L.5, Table L.5.1 to L.5.7. Based on bivariate analysis of different elements of the impact of environmental factors on E-Business adoption, environmental factors of "customer requirements", "competitive pressure", "industry" and "financial resource availability" have "very significant" impact on decision making regarding E-Business adaption, with respectively 25.4%, 17.9%, 16.4%, 10.4% of companies acknowledging their very significant impact on E-Business adoption. Before going any further in data analysis, in order to ensure meeting assumptions in bivariate analysis, recoding was carried out. The other reason for the recoding was that the main focus of the research is on discovering success patterns. So, it was interesting to bring together the two categories of "successful" and "very successful" in DV variable (the level of success of companies in E-supply chain adoption), therefore, the categories were merged. Similarly, the categories of "not significant" and "marginally significant" and also two categories of "significant" and "very significant" were also combined together to create 3 main categories in general for all the variables of IV.

5.6.2. Univariate analysis after recoding

Univariate analysis of the impact of various environmental factors on E-Business adoption after recoding can be found in Appendix M.5, Tables M.5.1 to M.5.7. The summary of main results is illustrated in Tables 5.33 and 5.34.

Table **Error! No text of specified style in document.**.33. Summary of Univariate analysis of the "level of success of companies in E-supply chain adoption"

Successful adoption of E-Business technologies	very successful-successful	partially successful	failure
Percentage and Frequency	52.2%	46.3%	1.5%

Table **Error! No text of specified style in document.**.244. Summary of Univariate analysis of the "impact of environmental factors" after recoding

Environmental factors	**Percentage and Frequency**		
	Not relevant-not significant	marginally significant	significant-very significant
Meeting customer requirements	9%	19.4%	71.6%
Competitive pressure	26.9%	23.9%	49.3%
Industry	35.8%	29.9%	34.3%
Financial resource availability	35.8%	31.3%	32.8%
Business partners pressure	46.3%	32.8%	20.9%
IS vendor support	42.4%	39.4%	18.2
Government regulations	59.1%	25.8%	15.2

The univariate analysis of "level of success of companies in E-supply chain adoption" (Table 5.33) demonstrates around half of the companies (52.2%) have "successfully-very successfully" adopted E-Business. Based on the univariate analysis of environmental factors (Table 5.34), "meeting customer requirements" (71.6%) and "competitive pressure" (49.3%) followed by "industry" (34.3%) and "financial resource availability" (32.8%) are the most influential environmental factors influencing "significantly-very significantly "the adoption of E-Business technologies in supply chain. On the other hand, "government regulations", "business partner's pressure" and "IS vendor support" did not have any significant impact or were not relevant to the companies being questioned, with respectively 59.1%, 46.3% and 42.4% of the companies not finding those variables important or relevant to the adoption of E-Business within their business.

5.6.3. Bivariate analysis after recoding

Bivariate analysis of the variables is done based on examining Null hypothesis 5.

Null hypothesis 5: There is no association between consideration and importance of environmental factors and successful implementation of electronic supply chain management.

Alternative hypothesis 5: A statistically significant association exists between consideration and importance of environmental factors and successful implementation of electronic supply chain management.

Examining Null Hypothesis 5: Table N.5.1 to N.5.21 (in Appendix N.5) illustrate the crosstabs, chi-square and significance tests for exploring null hypothesis 5.

A Chi-square test is based on the assumption that only 20% of cells should have an expected count less than 5. Since, this assumption has not been met for environmental factors of "meeting customer requirements" and "government", recoding is needed. The researcher would like to collapse the variables based on the main focus of this research which attempts to discover success patterns. So, the "marginally significant impact" goes under the first category of "not relevant-not significant", putting more emphasis on analysis of "significant-very significant" impacts.

The Univariate analysis after the final round of recoding, and bivariate analysis and significance testing analysis after final recoding are illustrated in Appendix O.5 and Appendix P.5, respectively. The assumption for all of the variables is met. Bivariate analysis of the level of success of companies in E-supply chain adoption and the impact of main environmental factors are summarised in Table 5.35.

Table **Error! No text of specified style in document.**.35. Summary of Bivariate analysis of the level of success of companies in E-supply chain adoption and the impact of main environmental factors

Environmental factors		Very successful-successful	Partially successful-failure	Chi-Square P value and Cramer's V
Meeting customer requirements	Not relevant-marginally significant	36.8%	63.2%	P=.112
	Significant-very significant	58.3%	41.7%	
Competitive pressure	Not relevant-marginally significant	41.2%	58.8%	P=.066 Cramer's Cramer's V=.225
	Significant-very significant	63.6%	36.4%	
Industry	Not relevant-marginally significant	43.2%	56.8%	P=.040, Cramer's Cramer's V=.251
	Significant-very significant	69.6%	30.4%	
Finance	Not relevant-marginally significant	48.9%	51.1%	P=.432
	Significant-very significant	59.1%	40.9%	
Business partners pressure	Not relevant-marginally significant	54.7%	45.3%	P=.429

	Significant-very significant	42.9%	57.1%	
IS vendor support	Not relevant-marginally significant	51.9%	48.1%	P=.684
	Significant-very significant	58.3%	41.7%	
Government regulations	Not relevant-marginally significant	48.2%	51.8%	P=.204
	Significant-very significant	70.0%	30.0%	

Having looked at Table 5.35, there seems to be evidence that all of the companies, even those who have failed in E-Business adoption, have agreed on the significant impact of "customer requirements" in successful implementation of ESCM. Further, only a small number of successful companies (36.8%) believe that the impact of "customer requirements" has been "not significant or even not relevant" to their success. Similarly, "competitive pressure" is seen as one of the main influential factors in adoption of E-Business with 63.6% of "successful to very successful" companies acknowledging its "significant to very significant" impact on implementation of E-Business technologies. While, a large number of partially successful companies consider this variable as being "not important or not relevant" to their success, which might be a reason behind their partial success.

For the variables of "industry" and "financial resource availability", more than half of companies (69.6%, 59.1% respectively) have agreed on importance of mentioned variables on success of ESCM practice. However, almost around the same number of the companies where E-Business adoption was "partially successful to failure" had the opposite view towards the impact of "industry" and "financial resource availability" in E-Business technology considerations (56.8%, 51.1% respectively).

Having looked at the Asymp. Sig. of the bivariate analyses, it seems that only the environmental variables of "competitive pressure" and "industry" meet significant P value with "industry" having 'Asymp. Sig. of .040, and "competitive pressure" having 'Asymp. Sig. of .066. This means that there is significant association between consideration of those variables and level of success of companies in E-Business adoption. However, "industry" seems to have the stronger association with successful adoption of electronic supply chain management, since its Cramer's V (.251) is slightly more than competitive pressure's Cramer's V (.225). Therefore, as relationship is found between some of the environmental variables and level of success of companies in E-Business adoption, the null hypothesis 5 is rejected, verifying that environmental factors can have a significant impact on ESCM implementation.

According to study of Ifinedo (2011), external pressure, which refers to pressure from industry and competitors will influence acceptance of IEBT in SMEs. Shen et al. (2004) argue that the external environment including the industry and competitors can have impact on adoption of E-Business technologies. Similarly, Piscitello and Sgobbi (2004), Coltman et al. (2007), Levenburg et al. (2006) and Li et al. (2010) believe that industry has a considerable impact upon the performance and strategic behaviour of SMEs and their E-Business capabilities.

5.6.4. Logistic Regression For environmental variables

Logistic Regression outputs for the level of success of companies in E-supply chain adoption and the impact of main environmental factors are illustrated in Tables 5.36, 5.37 and 5.38.

Table **Error! No text of specified style in document.**.36. Case processing summary

Unweighted Cases[a]		N	Percent
	Included in Analysis	65	97.0
Selected Cases	Missing Cases	2	3.0
	Total	67	100.0
Unselected Cases		0	.0
Total		67	100.0

Table **Error! No text of specified style in document.**.37. Dependent variable encoding

Original Value	Internal Value
marginally successful-failure	0
very successful-successful	1

Table **Error! No text of specified style in document.**.38. Categorical variables codings

		Frequency	Parameter coding
			(1)
Impact of the environmental variable of financial resource availability on E-Business adoption	not relevant-not significant-marginally significant	44	.000
	significant-very significant	21	1.000
Impact of the environmental variable of IS vendor support on E-Business adoption	not relevant-not significant-marginally significant	53	.000
	significant-very significant	12	1.000
Impact of the environmental variable of government on E-Business adoption	not relevant-not significant-marginally significant	55	.000
	significant-very significant	10	1.000
Impact of the environmental variable of customer requirements on E-Business adoption	not relevant-not significant-marginally significant	18	.000

	significant-very significant	47	1.000
Impact of the environmental variable of competitive pressure on E-Business adoption	not relevant-not significant-marginally significant	34	.000
	significant-very significant	31	1.000
Impact of the environmental variable of industry on E-Business adoption	not relevant-not significant-marginally significant	43	.000
	significant-very significant	22	1.000
Impact of the environmental variable of business partners pressure on E-Business adoption	not relevant-not significant-marginally significant	51	.000
	significant-very significant	14	1.000

Table 5.36 shows that there are two missing case. In Table 5.37 the dummy variable shows "very successful-successful" adoption of E-Business technologies, in contrast to "marginally successful-failure" adoption, which is considered as a reference group. IV dummy variable in Table 5.38 identifies companies that reported that various environmental factors have had "significant-very significant" impact on successful adoption of E-Business technologies (categories with value 1).

Total log-likelihood, which demonstrates the total variation available, and the model log-likelihood (MLL), which stands for the extent of the log likelihood accounted for in the model, are identified from Tables 5.39 and 5.40.

Table **Error! No text of specified style in document.**.39. Iteration history[a,b,c]

Iteration		-2 Log likelihood
Step 0	1	89.971
	2	89.971

Table **Error! No text of specified style in document.**.40. Omnibus tests of model coefficients

		Chi-square	Sig.
Step 1	Step	13.027	.071
	Block	13.027	.071
	Model	13.027	.071

TLL= 89.971

MLL=13.027

Having identified this information, the pseudo R-Square is calculated;

Pseudo R-Square=MLL/TLL=13.027/89.971= .14

So, the variation in different levels of IV (environmental factors influencing the adoption of E-Business technology) account for almost 14% of variation in successful E-Business adoption.

5.7. Data analysis part 5: Data analysis for identifying organisational factors influencing successful adoption of E-Business technologies

In this part, technological factor of "integration level of the IS/IT capabilities in the strategy" has been investigated as one of organisational factors. Univariate and bivariate analyses for identifying organisational factors influencing successful adoption of E-Business technologies are discussed in the following section.

5.7.1. Univariate analysis

Univariate analysis of the impact of organisational factors on E-Business adoption is illustrated in Appendix Q.5, Table Q.5.1 to Q.5.9.

Based on univariate analysis of organisational factors influencing the adoption of E-Business technologies, there is evidence that "IT competence" and "management support" are the main factors influencing "very significantly" the adoption of E-Business technologies in supply chain management, with 22.4% and 20.9% of the companies agreeing on their significance. This is followed by "size of the firm", "knowledge management" and "culture" (14.9%, 13.4% and 12.3% respectively). On the other hand "age of the firm" seems to have the least impact with only 4.5% of companies believing in its influence on decision making concerning E-Business adoption. Moreover, more than half of the companies (56.7%) considered the "alignment of IT capabilities with overall business strategy" as an important factor influencing the level of success of companies in electronic supply chain management adoption.

In order to be able to analyse the "successful to very successful" adoption of E-Business technologies, and to narrow down the number of categories for doing bivariate analysis recoding needs to be carried out.

5.7.2. Univariate analysis after recoding

Univariate analysis of impact of various organisational factors on E-Business adoption after recoding can be found in appendix R.5, Tables R.5.1 to R.5.8. The summary of univariate analysis of organisational factors after recoding is shown in Table 5.41.

Table **Error! No text of specified style in document.**.41. Summary of Univariate analysis of organisational factors after recoding

Organisational factors	**Percentage and Frequency**		
	Not relevant-not significant	marginally significant	significant-very significant
Management support	(13.4%)	(17.9%)	(68.7%)
IT competence	(11.9%)	(23.9%)	(64.2%)
Employees attitude	(19.4%)	(19.4%)	(61.2%)
Culture	(15.4%)	(35.4%)	(49.2%)
Size	(28.4%)	(25.4%)	(46.3%)
Inter organisational relationship	(37.3%)	(22.4%)	(40.3%)
Knowledge management	(23.9%)	(38.8%)	(37.3%)
Age	(46.3%)	(26.9%)	(26.9%)

Technological factor of alignment of IT capabilities with Overall business strategy	
Frequency	
Yes (57.6%)	No (42.4%)

Univariate analysis of organisational factors demonstrates that management support (68.7%), IT competence (64.2%) and employees attitude (61.2%) influence "significantly-very significantly" successful adoption of E-Business technologies in supply chain of SMEs. Whereas, age of the company seems to have the least impact with only 26.9% of companies agreeing that it can be an influential factor on the adoption of E-Business technologies.

5.7.3. Bivariate analysis after recoding

Bivariate analysis of the variables is done based on examining the following null hypothesis.

Null hypothesis 6: There is no association between consideration and importance of organisational factors and successful implementation of electronic supply chain management.

Alternative hypothesis 6: A statistically significant association exists between importance of organisational factors and successful implementation of electronic supply chain management.

- **Examining null hypothesis 6:**

Table S.5.1 to S.5.27 (Appendix S.5) illustrate the crosstabs as well as chi-square and significance tests for exploring Null hypothesis 6. Since, the Chi-square Table assumption is not met for any of organisational factors, the recoding is continued to resolve this problem and to conduct bivariate analysis.

5.7.4. Univariate analysis and bivariate analysis after final recoding

Univariate analysis and bivariate analysis for examining the null hypothesis 6 after the last recoding are shown in Appendices T.5 and U.5, respectively. The line at the bottom of all Chi-square Tables demonstrates that the chi-square assumption has been met, showing that 0% of cells have an expected count less than 5.

Bivariate analysis of the level of success of companies in E-supply chain adoption and the main organisational factors are summarised in Table 5.42.

Table **Error! No text of specified style in document.**.42. Summary of bivariate analysis of the level of success of companies in E-supply chain adoption and the main organisational factors

Organisational factors		**Very successful-successful**	**Partially successful-failure**	**P value and Cramer's V**
Management support	Not relevant-M significant	28.6%	71.4%	P=.009 Cramer's V=.320
	Significant-very significant	63.0%	37.0%	
IT competence	Not relevant-M significant	41.7%	58.3%	P= .196
	Significant-very significant	58.1%	41.9%	

Employees attitude	Not relevant-M significant	42.3%	57.7%	P= .195
	Significant-very significant	58.5%	41.5%	
Culture	Not relevant-M significant	45.5%	54.5%	P=.261
	Significant-very significant	59.4%	40.6%	
Size	Not relevant-M significant	52.8%	47.2%	P= .924
	Significant-very significant	51.6%	48.4%	
Inter organisational relationship	Not relevant-M significant	37.5%	62.5%	P=.003 Cramer's V=.359
	Significant-very significant	74.1%	25.9%	
Knowledge management	Not relevant-M significant	42.9%	57.1%	P= .046 Cramer's V= .243
	Significant-very significant	68.0%	32.0%	
Organisational factors		**Very successful-successful**	**Partially successful-failure**	**P value and Cramer's V**
Age	Not relevant-M significant	49.0%	51.0%	P= .378
	Significant-very significant	61.1%	38.9%	

Alignment of IT capabilities with Overall business strategy	Yes	65.8%	34.2%	P=.016 Cramer's V=.298
	No	35.7%	64.3%	

As it appears from Table 5.42, more than half of the companies that "successfully-very successfully" have adopted E-Business technologies in their supply chain management agreed on the "significant to very significant" impact of all the above mentioned organisational factors, with "inter organisational relationship" (74.1%), "knowledge management" (68.0%) and "management support" (63.0%) having the most impact. Looking at the Chi-Square P value and Cramer's V of organisational factors and successful adoption of electronic supply chain management, this relationship is validated. There is evidence that "management support" (P=.009), "inter organisational relationship" (P=.003), "alignment of IT capabilities with overall business strategy" (P=.016) and "knowledge management" (P= .046) have significant association with E-Business implementation, with successful electronic supply chain management being more dependent on "inter-organisational relationship" (Cramer's V=.359). Moreover, the majority of the companies adopting "successfully to very successfully" E-Business technologies in their supply chain processes (65.8%) believed that their IT capabilities had been aligned with their overall business strategy. The P value of .016 demonstrates that there is a significant association between the two variables. The strength of this association is quite high (Cramer's V=.298). Since there is evidence of a relationship between several organisational variables and successful adoption of E-Business technologies, the null hypothesis 6 is rejected. This means that a statistically significant association exists between importance of organisational factors and successful implementation of electronic supply chain management.

The study of Bruque and Moyano (2007) highlighted the significance of integration level of IT and business strategy. Moreover, Haug et al. (2011), who carried out research on IT adoption and IT readiness in SMEs, emphasized the impact of IT project motivation and management support on adoption of E-Business technologies in SMEs. Additionally, it is argued that knowledge management, organisational IT competence and level of organisational knowledge about technological innovations influence successful implementation of E-Business technologies in supply chain management (Raymond, 2001; Zhu et al., 2006). Other researchers, such as Shang et al. (2005) and Huang et al. (2008), demonstrated the importance of inter organisational relationships on the adoption of Inter Organisational System (IOS) such as EDI and E-Business. The findings of this research support the results of the mentioned studies.

5.7.5. Logistic Regression

Logistic Regression outputs for the level of success of companies in E-supply chain adoption and the impact of main organisational factors on E-Business adoption are illustrated in Tables 5.43, 5.44 and 5.45.

Table **Error! No text of specified style in document.**.43. Case processing summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	65	97.0
	Missing Cases	2	3.0
	Total	67	100.0
Unselected Cases		0	.0
Total		67	100.0

a. If weight is in effect, see classification Table for the total number of cases.

Table **Error! No text of specified style in document.**.44. Dependent variable encoding

Original Value	Internal Value
partially successful-failuire	0
very successful-successful	1

Table **Error! No text of specified style in document.**.45. Categorical variables codings

		Frequency	Parameter coding (1)
Impact of the organisational factor of culture on E-Business adoption	not relevant-not significant-marginally significant	33	.000
	significant-very significant	32	1.000
Impact of the organisational factor of employees attitude on E-Business adoption	not relevant-not significant-marginally significant	24	.000
	significant-very significant	41	1.000

Impact of the organisational factor of IT competence on E-Business adoption	not relevant-not significant-marginally significant	22	.000
	significant-very significant	43	1.000
Impact of the organisational factor of knowledge management on E-Business adoption	not relevant-not significant-marginally significant	40	.000
	significant-very significant	25	1.000
Impact of the organisational factor of Inter organisational relationship on E-Business adoption	not relevant-not significant-marginally significant	38	.000
	significant-very significant	27	1.000
Impact of the organisational factor of age of the firm on E-Business adoption	not relevant-not significant-marginally significant	48	.000
	significant-very significant	17	1.000
Impact of the organisational factor of size of the firm on E-Business adoption	not relevant-not significant-marginally significant	35	.000
	significant-very significant	30	1.000
Impact of the organisational factor of management support on E-Business adoption	not relevant-not significant-marginally significant	20	.000
	significant-very significant	45	1.000

Based on Tables 5.43-5.45 there are no missing cases. The dummy variable shows "very successful-successful" adoption of E-Business technologies, in contrast to "marginally successful-failure" adoption. IV dummy variable identifies companies that report that various organisational factors have had "significant-very significant" impact on successful adoption of E-Business technologies (categories with value 1).

The log-likelihood and the model log-likelihood are identified from Tables 5.46 and 5.47.

TLL= 89.971

MLL=15.646

Having identified this information, the pseudo R-Square is calculated (Pseudo R-Square=MLL/TLL=15.646/89.971=.17), so, the variation in different levels of IV (organisational factors influencing the adoption of E-Business technology) account for almost 17% of variation in successful E-Business adoption

Table **Error! No text of specified style in document.**.46. Iteration history[a,b,c]

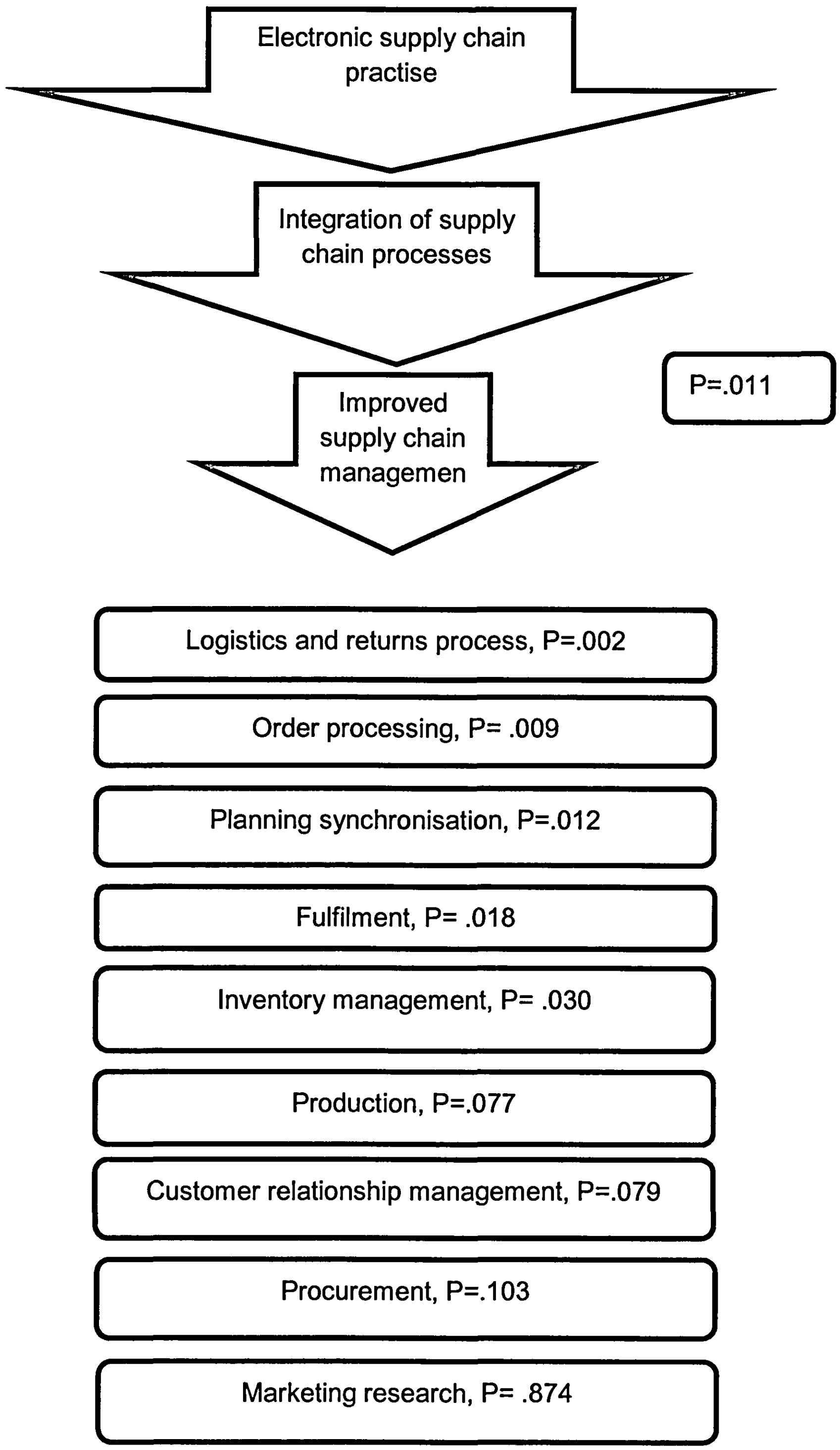
Iteration		-2 Log likelihood
Step 0	1	89.971
	2	89.971

Table **Error! No text of specified style in document.**.47. Omnibus tests of model coefficients

		Chi-square	Sig.
Step 1	Step	15.646	.048
	Block	15.646	.048
	Model	15.646	.048

The main findings of the hypotheses of this research are summarised in following figures.

Figure **Error! No text of specified style in document.**.16. Impact of E-Business on supply chain management



Based on figure 5.1, improvement in the supply chain could be through improving integration of business processes in the supply chain. As it can be seen form the figure, there is significant association between the impact of E-Business on the improvement of supply chain management and the integration of supply chains (Chi-Square P value= .011) Since the Chi-Square P value is far less than 5%, it can be concluded that the two variables of "helpfulness of E-Business on supply chain integration" and "Impact of E-Business on supply chain management" are significantly associated. So the null hypothesis (1) was rejected.

Moreover, based on figure 5.1 there is a significant association between the "helpfulness of E-Business technologies to supply chain integration" and improvement in the supply chain processes of "logistics and returns process", "order processing", "planning synchronisation", "procurement", "inventory management", "production" and "customer relationship management", with all of them having P value of well below or close to 5%. So, since there were strong associations found between the integration of supply chains (resulting from adoption of E-Business) and improvements in a number of supply chain processes, the null hypothesis (2) was rejected, meaning that E-Business technologies were found to improve various supply chain processes through improving supply chain integration.

Figure **Error! No text of specified style in document.**.17. Barriers in relation to successful adoption of E-Business technologies in supply chain

Low supplier E-Business use, P= .013

Being unaware of the potential of ICTs, P= .015

Lack of IT knowledge and skills, P=.019

Conducting business in defined niche markets, P=.042

Security and privacy concerns, P=.713

High cost of networking technologies, P=.968

High costs of research in the area of IT, NA

Being unconvinced of the benefits of E-Business, NA

High operation costs of ICT, NA

Lack of personnel to implement ICT, NA

Limited network bandwidth, NA

Difficulty and high costs of outsourcing IT act, NA

Unreliable and inconsistent network, NA

After the second coding still some of the variables did not meet the Chi-Square assumption, so, bivariate analysis was not applicable for those factors (N/A). Since the recoding was not possible anymore (there were only two categories left), the results of bivariate were interpreted only for valid tests. Based on figure 5.2, the Chi-Square P value for the valid tests demonstrates that there is a significant association between the level of success of E-Business technologies and the strength of the following barriers: "low supplier E-Business use"; "being unaware of the potential of ICTs"; "lack of IT knowledge and skills" and "conducting business in defined niche markets", with all of them having P value less than 5% (.013, .015, .019, .042, respectively). The Cramer's V showed that this association was the most strong for "low supplier E-Business use", followed by "being unaware of the potential of ICTs", "lack of IT knowledge and skills" and "conducting business in defined niche markets". Considering the fact that a significant association was found between "barriers of E-Business adoption" and "level of success in implementation of electronic supply chain management", the null hypothesis (3) was rejected. So, it was concluded that perceived barriers associated with the implementation of information technology in supply chain management could influence the successful adoption of E-Business technologies.

Figure **Error! No text of specified style in document.**.18. Benefits in relation to successful adoption of E-Business technologies in supply chain

Improved information sharing, P=.002

Improved supply chain management, P=.002

Improved planning, P=.033

Improved product flow management, P= .036

Enhanced competitive advantage, P= .071

Creating interactive relationships with customers, P=.120

Improved forecasting and planning, P= .215

Creating interactive relationships with suppliers, P=.612

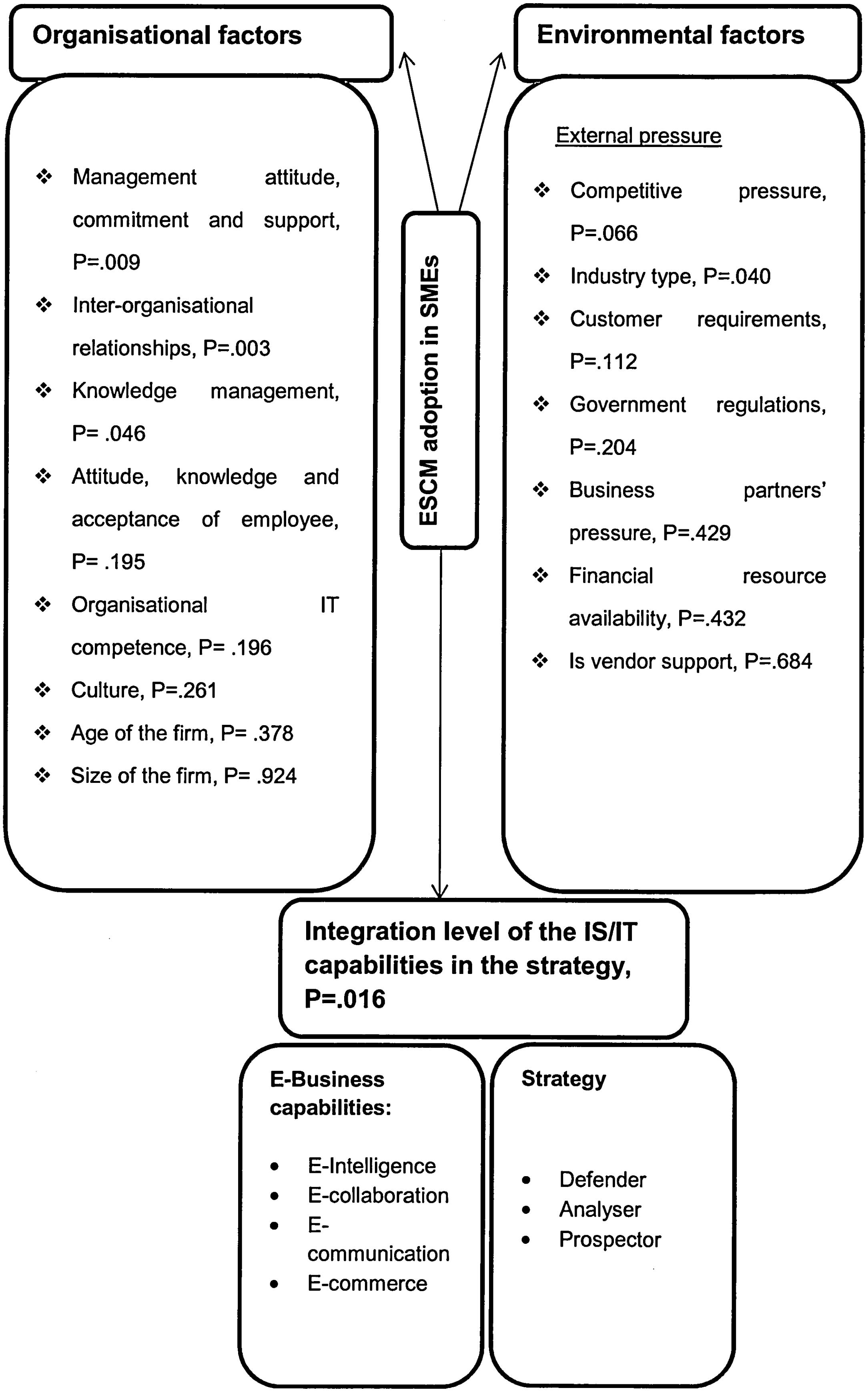
Improved customer service, P=.621

Enhanced customer satisfaction, P= .798

Expanded market share, P=.890

Figure 5.3 shows that there is a very significant association between the "level of success of companies" and the achieved benefits of "improved supply chain management" and "improved information sharing", with both of them having P value less than 5% (P=.002). Similarly, a significant relationship was found between the "successful adoption of E-Business technologies" and attained benefits of "improved planning", "improved product flow management" and "enhanced competitive advantage" (P=.033, Cramer's V=.260; P= .036, respectively). Since there was evidence of a statistically significant association between a few of the perceived benefits and successful implementation of electronic supply chain management, the null hypothesis (4) was rejected. This means that a statistically significant association exists between perceived benefits of adoption of E-Business technologies and successful adoption of electronic supply chain management.

Figure **Error! No text of specified style in document.**.19. Proposed ESCM framework



Based on figure 5.4, the environmental variables of "competitive pressure" and "industry" meet significant P value, with "industry" having 'Asymp. Sig. (P value) of .040, and "competitive pressure" having 'Asymp. Sig. of .066. This means that there is significant association between consideration of aforementioned variables and level of success of companies in E-Business adoption. Also, there is some level of association between variable of "customer requirements" and successful adoption of electronic supply chain management. Therefore, as relationship was found between some of the environmental variables and level of success of companies in E-Business adoption, the null hypothesis 5 was rejected, verifying that environmental factors can have a significant impact on ESCM implementation.

Moreover, based on this figure, there is evidence that "management support" (P=.009), "inter organisational relationship" (P=.003), "alignment of IT capabilities with overall business strategy" (P=.016) and "knowledge management" (P= .046) have significant association with E-Business implementation, with successful electronic supply chain management being more dependent on "inter-organisational relationship". Furthermore, the P value of .016 demonstrates that there is a significant association between the "integration level of IT strategy" and "successful IT adoption. Since there was evidence of a relationship between several organisational variables and successful adoption of E-Business technologies, the null hypothesis 6 was rejected. This means that a statistically significant association exists between importance of organisational factors and successful implementation of electronic supply chain management.

Figure **Error! No text of specified style in document.**.20. Proposed ESCM framework for manufacturing SMEs in the UK

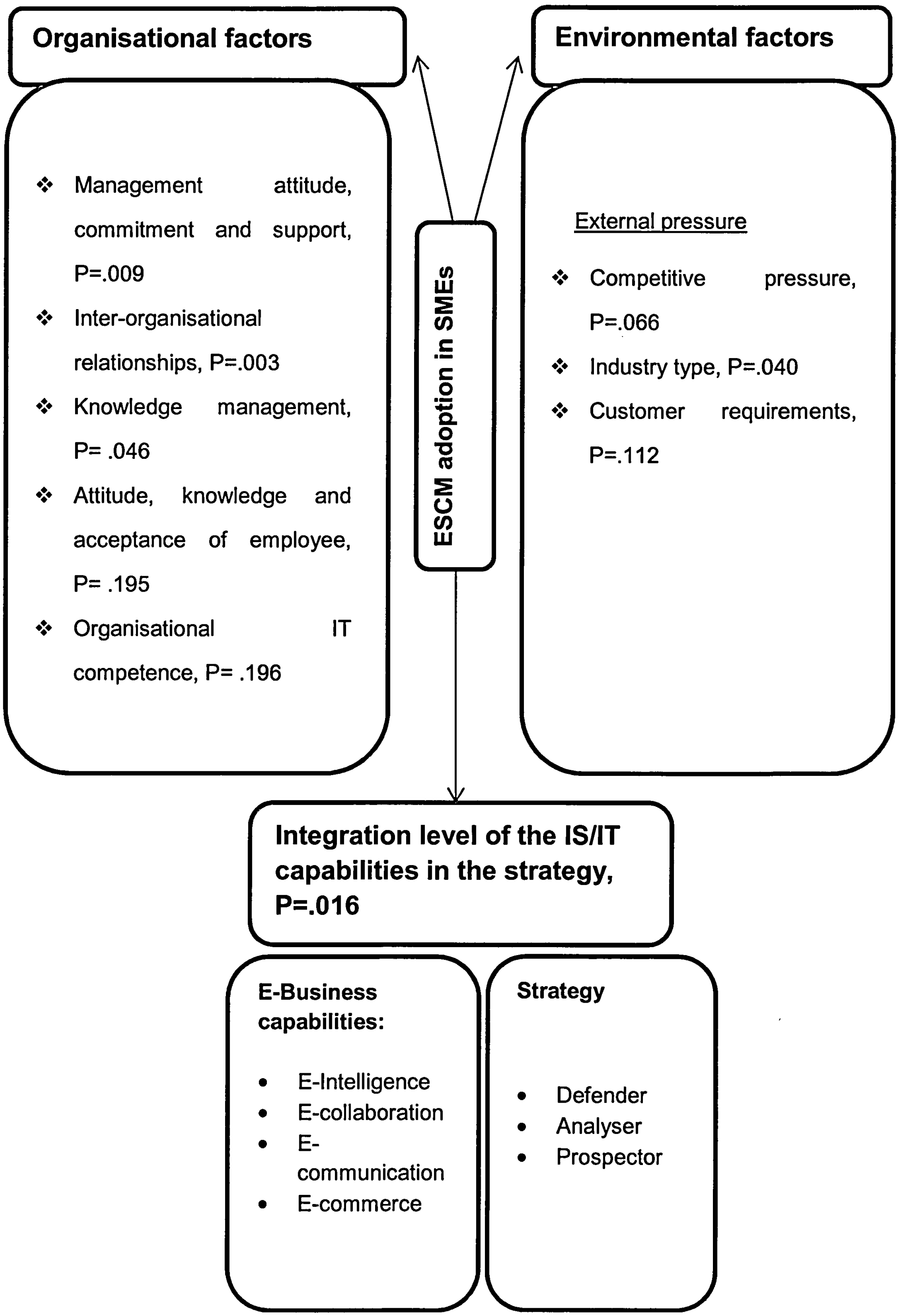


Figure 5.5 demonstrates the electronic supply chain practise model applicable for manufacturing SMEs in the UK (only the variables with valid P value have

been included in the model). This model shows the most important organizational, environmental and technological factors for manufacturing SMES in the UK that produce technological products. As it can be seen from the model, organizational factors of management attitude and support, inter-organisational relationships, knowledge management, organisational IT competence, and attitude and level of knowledge of employee should be considered when adopting electronic supply chain practise in manufacturing SMEs within the UK. Moreover, environmental and technological factors of competitive pressure, industry type, customer requirements and integration level of IT strategy are important factors that need to be taken into account.

Chapter 6. **Conclusion**

6.1. Introduction

This chapter draws a conclusion to the thesis by discussing the main issues debated in the previous chapters as well as research findings and observations made throughout the research process. The chapter begins by describing the main goals of the research. This is followed by discussing research hypothesis and summarising the research findings. Subsequently, the contribution of this research to knowledge and limitations and further research directions are presented.

Although several studies have tried to study the impact of E-Business on supply chain management, there is limited insight into how SMEs can successfully adopt ICT in conducting their supply chain processes, and enhance their overall supply chain management by improving the integration of their business activities. Both academics and practitioners acknowledge the importance of the integration of E-Business and the supply chain management (Haug et al., 2011; Simchi et al., 2004; Cegielski et al., 2012; Chou et al., 2004; Hollander et al., 2000; Doherty et al., 2003; Bruque and Moyano, 2007). Several models have been created in the previous academic literature, which identify various factors influencing the successful adoption of E-Business technologies. However, few of them have had a comprehensive approach towards different dimensions of E-Business adoption.

Drawing upon Tornatzky and Fleischer's (1990) Technology-Organisation-Environment (TOE) model, which has focused on the study of E-Business based on adoption of innovation, this research study attempts to investigate the phenomenon of ICT and E-business and its role on integration and improvement of supply chain management. This research, further, examines the benefits of implementation of ESCM as well as the barriers to adoption of E-Business technologies. Last but not least, E-Business technologies and the factors influencing the successful adoption of E-Business technologies in manufacturing SMEs have been scrutinised.

The theoretical model proposed in the Literature Review chapter and the research hypotheses related to the model were deduced from relevant literature explored in the second chapter. The comprehensive literature review enabled the exploration of research objectives as well as the development of research hypotheses. The hypotheses are summarized in Table 6.1. The hypotheses and the proposed model derived from the review of academic literature were tested using a research survey among the manufacturing SMEs in the UK.

Table **Error! No text of specified style in document.**.25. Hypotheses

Hypotheses	
Null hypothesis 1	There is no association between adoption of electronic supply chain management and integration of supply chain.
Null hypothesis 2	There is no association between integration of supply chain (resulted from adoption of E-Business) and improvement of supply chain processes.
Null hypothesis 3	There is no association between barriers of E-Business adoption and successful implementation of electronic supply chain management.
Null hypothesis 4	There is no association between perceived benefits of adoption of E-Business technologies and successful adoption of electronic supply chain management.
Null hypothesis 5	There is no association between consideration and importance of environmental factors and successful implementation of electronic supply chain management.
Null hypothesis 6	There is no association between consideration and importance of organisational factors and successful implementation of electronic supply chain management.

6.2. Research outcomes

The research attempted to investigate E-Business technology adoption in supply chain of SMEs within the UK based on following research objectives:

1. Investigating the integration of E-Business and supply chain management
2. Exploring the impact of electronic supply chain practice on supply chain integration
3. Discovering the benefits and obstacles of adoption of E-supply chain practice in SMEs
4. Exploring different E-supply chain models and developing an appropriate and applicable framework for manufacturing SMEs

6.3. Discussion of findings

In the following section the main findings of this research will be discussed.

6.3.1. Hypotheses 1 and 2

The result of univariate and bivariate analyses of adoption of electronic supply chain management and improved integration of supply chain processes demonstrate that the factors are strongly associated ($P=.011<0.05$). As a result, the null hypothesis (1) was rejected, demonstrating that adoption of E-Business in supply chain management can enhance incorporation of supply chain processes. Similarly, hypothesis 2 posited a significant association between the impact of E-Business technologies on enhancing supply chain integration and the improvement of "logistics and returns process", "order processing", "planning synchronisation", "procurement", "inventory management", "production" and "customer relationship management" (See Table 5.9). This means that integration of supply chain processes, which was resulted from adoption of E-Business technologies, influences and improves mentioned supply chain activities. The strongest association was found on "logistics and returns process", followed by "order processing", "planning synchronisation", "procurement", "inventory management" and "production" ('Cramer's V' respectively; .444, .382, .370, .351, .328, .281 and .279). Considering the existence of associations found between integration of supply chain and improvements in the supply chain processes mentioned, the null hypothesis (2) was rejected, which approved the impact of E-Business technologies on improvement of supply chain integration.

Moreover, having conducted regression analysis, the pseudo R-Square, which identifies the proportion of variation in the DV that is accounted for in the model, was identified. Having divided the model log-likelihood by the total log-likelihood, pseudo R-Square equalled .19, meaning that the variation in different levels of IV (impact of E-Business in various supply chain processes) account for 19% of variation in overall Supply chain integration.

The findings support previous research on the relationship between above discussed variables. Giménez and Lourenco (2008) argue that information technology improves the reverse logistics and returns process by enabling efficient data and information sharing between various parties in the supply chain. Moreover, inter-organisational networks, established using information technology, result in increased efficiency of order processing (Johnson and Vitale, 1988; Koh and Maguire, 2004).

Additionally, based on the study of Avlonitis and Karayanni (2000), E-Business allows companies to offer value added services to the end customer as well as improving customer relationship management. Feindt et al. (2002) and Giménez and Lourenco (2008) highlight the importance of establishing effective customer relationship as one of critical success factors for rapid growth of SMEs engaged in E-Business. Based on their study, integration of internal business processes, and effective collaboration with different parties in the supply chain result in improvement of customer relationship management. Furthermore, the study of Giménez and Lourenco (2008) highlighted the significance of web-based technologies in improving the efficiency of the procurement process. Other scholars have emphasised the impact of integrated networks on decreased cost and reduced inventory levels (Ho, 2009; Vakharia, 2002; Muffatto and Payaro, 2004). It is argued that IT analytical tools enable anticipation of changes in customers' demand and enhance responsiveness through analysing customer orders at the operational and strategic level. This, in turn, results in obtaining the optimal inventory level and designing efficient supply network (Giménez and

Lourenco, 2008). Moreover, according to Iyer (2011), improvements in operational processes lead to top-line and bottom-line financial performance gains such as improved customer delivery, reliability and improved inventory turnover rates.

Additionally, it is believed that information systems provide support for efficient material flow network from customer order to production, storage, distribution and delivery (Yin and Khoo, 2007). Reduced production cycles, resulted from high speed of communication and implementation of internet-based production planning systems, improve production decision making process. Moreover, electronic systems evaluate production requirements and allow for defining strategy for different manufacturing sections (Giménez and Lourenco, 2008). According to Malone et al. (cited in Cagliano et al., 2005), widely used electronic communication systems such as EDI reduce the synchronization costs of production and economic transactions. In other words, E-Business coordination applications enable the planning and evaluation of supply chain processes and business operations (Zhu and Kraemer, 2002; Barua et al., 2004). Coordinated planning and business operations within supply chain activities provide better access to information, and decrease non-value added activities, contributing to improved performance (Germain and Iyer, 2006; Rodrigues et al., 2004). Swaminathan and Tayur (2003) argue that the internet enables the supply chain partners to have access to the knowledge sharing systems such as data analysis and modelling, which allows enhanced planning and decision making. In the same way, Giménez and Lourenco (2008) believe that the internet and web-based technologies can provide companies with the benefit of improved forecasting and planning through collaboration with business partners. All these studies support the findings of this research for hypotheses 1 and 2.

6.3.2. Hypothesis 3

Testing hypothesis 3 proved the existence of significant association between the level of success of E-Business technologies and strength of the barriers of "low supplier E-Business use", "being unaware of the potential of ICTs", "lack of IT knowledge and skills" and "conducting business in defined niche markets" (p value respectively: .013, .015, .019, .042). Since a significant association was found between a few of "barriers of E-Business adoption" and "level of success in implementation of electronic supply chain management", the null hypothesis (3) was rejected. In other words, based on data analysis, perceived barriers associated with the implementation of information technology in supply chain management can influence the level of success in adoption of E-Business technologies. Moreover, Pseudo R-Square of .35, indicates that the variation in different levels of barriers of adoption of E-Business technologies account for 35% of variation in successful E-Business adoption.

The findings of this research, with regards to barriers influencing acceptance of E-Business, certify the studies of Dixon et al. (2002), Kohli and Grover (2008), Ifinedo (2011) and Wiengarten et al. (2011). The barriers of "being unaware of the potential of ICTs", "lack of IT knowledge and skills" and "conducting business in defined niche markets" have been emphasised as main obstacles for implementation of IT in SMEs by Dixon et al. (2002). Similarly, based on the study of Ifinedo (2011), the level of knowledge of companies, in terms of potential of ICTs, influence the adoption of internet technologies in SMEs. Moreover, the importance of integration of a firm's E-Business systems with its supplier's E-Business systems is argued to be very important on successful implementation of E-Business technologies (Kohli and Grover, 2008; Wiengarten et al., 2011).

6.3.3. Hypothesis 4

Based on examination of hypothesis 4, there is a significant relationship between the "level of success of companies" in adoption of electronic supply chain management, and the achieved benefits of "improved supply chain management", "improved information sharing", "improved planning", "improved product flow management" and "enhanced competitive advantage" P values respectively: .002, .002 .033, .036, .07). The strongest associations were fond for variables of "improved information sharing" and "improved supply chain management" (Cramer's V respectively: .379, .376). As there was evidence on statistically significant association between a few of the perceived benefits and successful ESCM adoption, the null hypothesis (4) was rejected. This means that perceived benefits of adoption of E-Business technologies can influence adoption of electronic supply chain management. Additionally, based on

Pseudo R-Square, the variation in different levels of benefits achieved from adoption of E-Business technologies account for almost 17% of variation in successful E-Business adoption.

According to researchers such as Damanpour (2001) and Ho (2009) integrated supply chain, improved communication and management of information are the main benefits of ESCM adoption. Likewise, Moodley (2001) and Giannakis and Croom (2004) emphasise the significant impact of IT on supply chain structures, coordination and improved supply chain management. Furthermore, it is believed that web-based technologies enable companies to enhance their forecasting and planning synchronisation through effective collaboration with business parties. Information technologies, also, facilitate workflow coordination and lead to efficient product flow management through efficient information sharing. All these capabilities, consequently, improve customer satisfaction and create sustainable competitive advantage for companies (Lee and Whang, 2001; Giménez and Lourenco, 2008).

6.3.4. Hypothesis 5

Following bivariate analysis of environmental factors influencing successful adoption of E-Business technologies, two environmental variables of "competitive pressure" and the "type of industry" met significant P value (P values respectively: .066, .040), meaning that there is significant association between the 2 variables and successful implementation of E-Business technologies. Therefore, as relationship was found between some of the environmental variables and level of success of companies in E-Business adoption, null hypothesis 5 was rejected, verifying that environmental factors have a significant impact on ESCM implementation.

Moreover, based on Regression analysis, variation in different levels of environmental factors influencing the adoption of E-Business technology accounts for 14% of variation in successful E-Business adoption (Pseudo R-Square=.14).

Study of Ifinedo (2011) is consistent with the findings of this research for hypothesis 5. His research on 'acceptance of internet and E-Business technologies by SMEs' highlighted the influence of external pressure, including pressure from industry and competitors on implementation of IEBT in SMEs. Similarly, based on the study of Shen et al. (2004) external environmental factors such as the type of industry and competitors can have a significant impact on adoption of E-Business technologies. Industry is believed to have a considerable influence upon the performance and strategic behaviour of SMEs and their E-Business capabilities (Piscitello and Sgobbi, 2004; Coltman et al., 2007; Levenburg et al., 2006; Li et al., 2010).

6.3.5. Hypothesis 6

There was evidence that organisational variables of "management support", "inter organisational relationship", "alignment of IT capabilities with overall business strategy" and "knowledge management" have significant association with E-Business implementation (P Values respectively: .009, .003, .016, .046). Based on data, successful electronic supply chain management was more dependent on "inter-organisational relationship", which had the strongest association (Cramer's V=.359). Furthermore, more than half of the companies that had "successfully to very successfully" adopted E-Business technologies in their supply chain processes reported that their IT capabilities had been aligned with their overall business strategy. This demonstrates that there is a significant association between the two variables of "alignment of IT capabilities with overall business strategy" and "level of success of companies in ESCM adoption". Considering the fact that there was evidence of relationship between several organisational variables and successful adoption of E-Business technologies, null hypothesis 6 was rejected, resulting in validation of alternative hypothesis 6. Moreover, Regression analysis demonstrated that variation in different levels of organisational factors influencing the adoption of E-Business technology comprises almost 17% of variation in successful E-Business adoption.

In the same line with this research, Bruque and Moyano (2007) argue that integration level of IS/IT in the business strategy influences implementation of IT in companies. In other words, overall business strategy should be consistent with the information technology adopted in order to result in successful implementation of IT project. The study of Haug et al. (2011) on IT adoption and readiness in SMEs underpins the results of this research with regard to important impact of IT project motivation and management support on adoption of E-Business technologies in SMEs. In addition, it is argued that organisational knowledge about technological innovations and IT competencies as well as knowledge management effect successful implementation of E-Business technologies in supply chain management (Raymond, 2001; Zhu et al., 2006). Moreover, it is believed that effective inter related networks and inter organisational relationships can support accomplishment and adoption of Inter Organisational System (IOS) such as EDI, and E-Business (Shang et al., 2005; Huang et al., 2008). These arguments support the findings of this research for hypothesis 6.

6.4. Research contribution

This research contributes to the body of knowledge in five main areas. The first contribution of this study concerns the review of the previous literature in the areas of E-Business, supply chain management and ESCM adoption in SMEs as well as exploring several theories of information technology adoption in companies. The broad and critical investigation and comparison of the literature has created a valuable benchmark for any research in this area. This research, also, contributes to the emerging stream of research in the area of sustainability and sustainable competitive advantage, which attempts to explore the impact of E-Business technologies on creating a sustainable supply chain management. Another impact of this study is on the increasing body of research focusing on corporate strategy and alignment of various strategic approaches with IT capabilities. The findings of this study reveal and verify that supply chain integration is the main benefit of use of E-Business technologies within the supply chain. Subsequently, improvement and integration of individual supply chain processes/parties results in overall improvement of supply chain management.

The second contribution of this study is the construction of new ESCM model, which was designed and built based on the concept of Technology-Organisation-Environment (TOE) theory. The main purpose of the model is to assist companies in adoption of information and communication technologies into supply chain management. The framework can be very valuable for IT managers with regards to the consideration of factors for successful implementation of IT projects. Having adopted TOE theory, this research has investigated the adoption of E-Business technologies based on adoption of new innovation in companies. The key technological, organisational and environmental factors have been discussed and analysed in depth to identify main effective variables in adoption of ESCM. Having scrutinised previous electronic supply chain models existed in the previous academic literature, the researcher has proposed a comprehensive ESCM framework. Subsequently, the framework has been examined through launching survey research in manufacturing SMES in the UK. It is hoped that the results of data analysis for hypothesis 5 and 6, which looks into examination of the proposed model, will provide a real scale for companies with reference to influence of various factors in successful adoption and implementation of E-Business technologies in supply chain of companies.

The third contribution to knowledge is provided from the application of the proposed model. The ESCM suggested model could be used for developing a holistic and strategic IT plan that would, in turn, help to evaluate the readiness of companies with regards to adoption of information and communication technologies. Also, the model can provide project direction and enable monitoring the process of ESCM adoption. Based on this research, environmental, technological and organisational factors can no longer be considered in isolation when considering their impact on IT adoption. Therefore, all the mentioned factors need to be considered in conjunction with IT strategies. Implementation of any IT project should take into account strategic planning, careful consideration as well as re-adjustment.

The fourth contribution concerns the main focus of this research which is in the area of SMEs. According to recent studies, many SMEs fail to identify the critical success factors influencing the adoption of E-Business in their supply chain. Moreover, there is narrow insight into how SMEs can apply information technologies to enhance their performance. As a result, the implementation of ESCM in many SMEs often does not lead to significant benefits. This research has explored the key factors behind successful implementation of E-Business technologies, which can be very beneficial for small to medium sized enterprises. The different nature of SMEs, compared to big companies, should be considered when evaluating the adoption of ICT in SMEs (Taylor and

Murphy, 2004). Implementation of E-Business in SMEs differs from larger companies since they face different challenges (Barua et al. 2001) such as: lack of financial resources; lack of expertise and skilled employee; and having rigid production plan (Huin, 2004; Lee et al., 2005; Forsman, 2008; Andersson and Tell, 2009). Therefore, information systems adopted by large companies may not be appropriate for SMEs (Premkumar, 2003). The consideration of all the mentioned issues makes this research a valuable piece of work, especially for SMES.

The fifth and final key contribution to knowledge of this research is in-depth investigation and analysis of benefits and barriers of E-Business adoption. This could be used mainly in decision making regarding adoption and implementation of ICT in supply chain management of companies. In other words, companies can carefully compare and evaluate the potential advantage and disadvantages of implementation of IT projects, and after anticipating possible results, make their final decision regarding the use of information and communication technologies.

6.5. Recommendation

As a result of accomplishment of this research, several organisational, managerial and theoretical recommendations are offered.

6.5.1. Organisational recommendations

Based on the results of this research, adoption of electronic supply chain management leads to improvements in integration of supply chain processes, mainly through improving supply chain processes of "logistics and returns process", "order processing", "planning synchronisation", "procurement", "inventory management", "production" and "customer relationship management". Moreover, the results of this research demonstrated that the manufacturing SMEs in the UK ,when adopting E-business in their supply chain management, need to pay more attention to "management support", "inter organisational relationship", "alignment of IT capabilities with overall business strategy" and "knowledge management", as organisational factors, and "competitive pressure" and "industry", as environmental factors. Manufacturing SMEs need to bear in mind that the implementation of E-Business, through improving information sharing and planning, results in improved product flow management and supply chain management. This, in turn, creates competitive edge for SMEs.

It has been emphasised that the type of the industry and the sector in which a company conducts its business can have an impact on implementation of internet and E-Business technologies (Drew, 2003; Levenburg et al., 2006; Jeyaraj et al., 2006; Li et al. 2010). Industry is argued to considerably influence the performance and strategic behaviour of SMEs (Mauri and Michaels, 1998), as well as their E-Business capabilities (Piscitello and Sgobbi, 2004; Coltman et al., 2007). Additionally, it is argued that competitors can put pressure on SMEs to adopt and use a certain kind of E-Business technology (Ifinedo, 2011). Competitors can, also, impose strategic behaviour upon SMEs (Freel, 2000), which in turn, restricts the IT options available for SMEs.

One of the other issues worth considering is the level of E-Business practice of suppliers (suppliers E-Business readiness). In other words, E-Business resources need to be integrated throughout the supply chain and implemented by all supply chain members in order to be a source of significant performance improvement (Barua et al., 2004; Wiengarten et al., 2011). Along with consideration of these issues, SMEs, also, need to think beyond conducting business in small and defined niche markets and encourage connectivity through the use of internet and E-Business technologies (Dixon et al., 2002, Buckley and Montes, 2002).

6.5.2. Managerial recommendations

The findings of this study demonstrate that management support has a significant influence on the adoption of electronic supply chain management. This suggests that effective management of IT projects is vital to the successful adoption and implementation of E-Business. Managers need to have positive attitudes towards innovation and use of new information technologies. Furthermore, for successful implementation of ESCM, careful and constant supervision on adoption and implementation is necessary across various supply chain processes.

It is argued that IT project support, IT skills, and IT project motivation provide a solid basis for evaluating IT-readiness in companies (Haug et al., 2011), and managers should consider these issues when adopting E-business technologies. Additionally, managers need to provide the whole organisation with a clear goal, in terms of the adoption on new IT, as well as explaining the potential of the specific ICT and its impact on the organisation. Executives should provide the employees with detailed instructions and direction towards the implementation of IT project, and take into account organisational culture and individual concerns before launching any E-Business technology in their supply chain management (Wagner et al., 2003; Chan and Ngai, 2007). Moreover, employees need to have a reasonable amount of IT knowledge and skills, as well as the ability to manage the IT knowledge in the organisation (Wagner et al., 2003; Croom, 2005). Therefore, managers need to make sure that the skills and knowledge required for adoption can be provided either internally through their own employees or externally through IS vendors.

In addition, managers, in order to ensure prosperous implementation of E-Business technologies, need to ensure the alignment of IT capabilities with their overall business strategy. High alignment of E-Business capabilities with business strategies (defender, analyser, and prospector) results in enhanced performance through influencing growth, productivity and profitability (Raymond and Bergeron, 2008). Similarly, the strategy selected with regard to IT implementation can have a significant impact on IT adoption (Lewis and Cockrill, 2002; Teo and Pian, 2003).

Last but not least, in order to control the impact of change in the organisation as well as prevent any possible disruptions, managers need to enable effective communication, information sharing and planning. This can be done through setting up efficient inter-organisational systems and facilitating inter-organisational relationships. Inter-organisational relationship factors such as trust, communication, collaboration, information sharing and trading partner's power affect electronic supply chain adoption in SMEs (Chong et al., 2009).

6.5.3. Theoretical recommendations

This research investigates electronic supply chain practice and highlights the relationship between the adoption of E-Business technology and improvement of supply chain management. Using TOE theory (Tornatzky and Fleischer, 1990) and Ifinedo's ESCM model (2011), a new framework was suggested which looks into the role of different technological, organisational and environmental factors on successful adoption of E-Business technologies in companies. This research, having followed comprehensive approach and through proposing a comprehensive model, has identified individual factors influencing E-business adoption and has led to a clearer understanding of the implementation of IT.

The proposed ESCM model suggests that the higher the alignment of IT capabilities with overall business strategy is, the more successful the implementation of IT will be. Moreover, the more focused and clear the strategy selected with regards to IT implementation, the easier the IT can penetrate within the supply chain processes and the greater the benefits can be realised. The new framework can be mainly used for evaluating decision making processes regarding implementation of E-Business. This study, also, has contributed to a greater understanding of impact of E-Business on improvement of various supply chain processes. This can be valuable for SMEs, in terms of evaluating the role of E-business on each of the supply chain processes.

6.6. Limitation and further research direction

This research has explored in-depth previous literature and discovered more directions and questions to be investigated. The main focus of this research is on electronic supply chain practice and how E-Business technologies can successfully be implemented within supply chain management and how this can be assisted considering the factors of proposed ESCM model. However, further expansion of the research and development of the proposed model is possible. In the following section further research developments are suggested and some limitations are outlined. The limitations, if addressed, could have resulted in additional insights to the research, however, due to time and cost limitations, this was not possible.

This research has been conducted within manufacturing industry and is based on the results gathered from SMEs in the UK. It would be interesting to apply the proposed framework to other industries, and to compare whether the results of this research could be equally applied to other sectors. Further comparison could even involve SMEs in other countries or even large enterprises, where different environmental, organisational and technological circumstances exist. This, in turn, would enable comparative research that could assist companies in understanding global nature of various industries as well as different organisational behaviours. Similarly, given the popularity and admiration of information and communication technologies (Jap, 2007) and appearance of globalisation, more attention and future research is required. For instance, the role of E-Business in improvement of global supply chains could be explored and investigated. Also, the suggested ESCM model could be applied and examined on a global basis.

Considering organisational change and development and evolution of organisations, as well as their impact on the organisation, it would be helpful to discover and compare the results of applying the proposed ESCM model over a few years. Furthermore, the key drivers that positively and dynamically encourage transformation and the main barriers that inhibit and constrain change in organisations could be discussed more in depth. Likewise, the social and individual barriers to successful adoption of IT projects need greater consideration. Therefore, it would be helpful if organisational culture/behaviour and perceptions of individuals/employees concerning the adoption of IT could be looked into in a new study.

Future research could look deeply into how financial resource and IT resource availability can influence the decision making about adoption of E-Business technologies. Also, a deeper evaluation of the impact of E-Business technology on improving sustainability in supply chain management is needed. Moreover, it could be useful if the survey research and investigation, with reference to the role and impact of adoption of E-Business technologies, could be carried out within different segments and departments in organisations.

This study is mainly based on TOE theory. It may be valuable for future studies to look into this subject from other perspectives, such as the theory of diffusion of innovation and theory of Resource Based View (RBV). Additionally, this research provides empirical evidence about organisation itself. The human dimension, which is a critical theme in supply chain management, and its influence on successful adoption of E-Business technologies has been partly investigated, but needs further exploration. The latter concern is of key significance, since based on the findings of this research encouragement and attitude of managers and employees are critical to success of IT projects.

In terms of methodological paradigm, deductive and positivistic nature of this research restricted communication with respondents and prevented the opportunity for explanation and clarifications. This, in turn, restricted data collection to some extent. Moreover, multivariate data analysis in this research could not be conducted since some assumptions in bivariate analysis were not met to continue to multivariate analysis. If it had been possible to conduct multivariate analysis, it could have enhanced the depth of data analysis.

Another limitation of this research stems from its response rate (67 out of 500 sample size), which somehow limits the generalisation of finding of this study to other SMEs. Also, conducting survey research and designing a comprehensive research design prevented the development and discovery of detailed questions. Therefore, conducting this research using other kinds of research methodologies offers a significant research agenda for the further research. For instance, case studies might provide in-depth understanding of the phenomenon of ESCM in SMEs.

6.7. Conclusion

This study addresses the role of E-Business technologies in the integration of various supply chain processes as well as improvement of supply chain management. Furthermore, it investigates adoption and acceptance of information technologies in SMEs by looking into technological, environmental and organisational factors influencing the implementation of E-Business technologies. This chapter provides a summary of research outcomes which answers the designed research questions and result in accomplishment of objectives of the research.

This study and its empirical outcomes can be valuable for manufacturing SMEs in strategic planning and decision making regarding the evaluation of E-Business adoption in supply chain management. It is argued that although information and communication technologies, through enabling improved responsiveness and efficient information flows, can lead to considerable performance improvements and enhanced process efficiency, on the other hand, if not appraised carefully, they can result in failure and disappointment among the employees. Therefore, not only strategic planning and careful evaluation of potential of IT is required, the constant monitor and re-adjustment of IT projects is equally necessary. In this chapter, managerial and theoretical recommendations were provided to offer some beneficial direction for managers, and finally this was followed by outlining some limitations and further research direction.

The main contribution of this study is development and provision of a comprehensive and empirically verified theoretical basis in the area of electronic supply chain management. The impact of information and communication technologies, as significant breakthrough, in improving the integration of business processes has been frequently emphasised in the previous literature. This research, given its critical and inclusive nature, could be used as a benchmark for further studies.

There is another contribution towards the adoption and acceptance of E-Business technologies in supply chain management through the development of ESCM adoption framework (mainly for manufacturing SMEs in the UK). Moreover, critical success factors and elements encouraging the adoption of E-Business technologies as well as the possible obstacles restricting the implementation of IT have been thoroughly explored and investigated in this research.

In summary, this study provides a comprehensive understanding of electronic supply chain practice and its influence on organisations. Further evolution and expansion of this research and addressing issues discussed in this chapter are highly recommended. It is hoped that this research has enthused and inspired other academics and researchers by shedding light on the promising area of electronic supply chain management.

Appendix A.5. Univariate analyses of impact of E-Business on different supply chain business processes

Table A.5.1. Impact of E-Business on Customer Relationship Management

		Frequency	Valid Percent
Valid	not relevant	8	11.9
	not beneficial	3	4.5
	marginally beneficial	18	26.9
	Beneficial	26	38.8
	very beneficial	12	17.9
	Total	67	100.0

Table A.5.2. Impact of E-Business on marketing research

		Frequency	Valid Percent
Valid	not relevant	10	14.9
	not beneficial	8	11.9
	marginally beneficial	10	14.9
	Beneficial	29	43.3
	very beneficial	10	14.9
	Total	67	100.0

Table A.5.3. Impact of E-Business on management of distribution channels

		Frequency	Valid Percent
Valid	not relevant	13	19.4
	not beneficial	5	7.5
	marginally beneficial	23	34.3
	Beneficial	18	26.9
	very beneficial	8	11.9
	Total	67	100.0

Table A.5.4. Impact of E-Business on order processing

		Frequency	Valid Percent
Valid	not relevant	3	4.5
	not beneficial	1	1.5
	marginally beneficial	18	26.9
	Beneficial	22	32.8
	very beneficial	23	34.3
	Total	67	100.0

Table A.5.5. Impact of E-Business on production

		Frequency	Valid Percent
Valid	not relevant	8	11.9
	not beneficial	7	10.4
	marginally beneficial	15	22.4
	Beneficial	26	38.8
	very beneficial	11	16.4
	Total	67	100.0

Table A.5.6. Impact of E-Business on logistics and returns process

		Frequency	Valid Percent
Valid	not relevant	8	11.9
	not beneficial	5	7.5
	marginally beneficial	18	26.9
	Beneficial	25	37.3
	very beneficial	11	16.4
	Total	67	100.0

Table A.5.7. Impact of E-Business on product development

		Frequency	Valid Percent
Valid	not relevant	15	22.4
	not beneficial	5	7.5
	marginally beneficial	25	37.3
	Beneficial	17	25.4
	very beneficial	5	7.5
	Total	67	100.0

Table A.5.8. Impact of E-Business on planning synchronization

		Frequency	Valid Percent
Valid	not relevant	11	16.4
	not beneficial	6	9.0
	marginally beneficial	14	20.9
	Beneficial	27	40.3
	very beneficial	9	13.4
	Total	67	100.0

Table A.5.9. Impact of E-Business on manufacturing flow management processes

		Frequency	Valid Percent
Valid	not relevant	15	22.4
	not beneficial	4	6.0
	marginally beneficial	21	31.3
	Beneficial	20	29.9
	very beneficial	7	10.4
	Total	67	100.0

Table A.5.10. Impact of E-Business on lead time management

		Frequency	Valid Percent
Valid	not relevant	12	17.9
	not beneficial	6	9.0
	marginally beneficial	23	34.3
	Beneficial	18	26.9
	very beneficial	8	11.9
	Total	67	100.0

Table A.5.11. Impact of E-Business on inventory management

		Frequency	Valid Percent
Valid	not relevant	7	10.4
	not beneficial	7	10.4
	marginally beneficial	17	25.4
	Beneficial	23	34.3
	very beneficial	13	19.4
	Total	67	100.0

Table A.5.12. Impact of E-Business on procurement

		Frequency	Valid Percent
Valid	not relevant	7	10.4
	not beneficial	2	3.0
	marginally beneficial	19	28.4
	Beneficial	20	29.9
	very beneficial	19	28.4
	Total	67	100.0

Table A.5.13. Impact of E-Business on fulfilment

		Frequency	Valid Percent
Valid	not relevant	9	13.4
	not beneficial	3	4.5
	marginally beneficial	17	25.4
	Beneficial	32	47.8
	very beneficial	6	9.0
	Total	67	100.0

Table A.5.14. Impact of E-Business on demand management processes

		Frequency	Valid Percent
Valid	not relevant	9	13.4
	not beneficial	7	10.4
	marginally beneficial	23	34.3
	Beneficial	19	28.4
	very beneficial	9	13.4
	Total	67	100.0

Appendix B.5. Univariate analyses of the impact of E-Business on various supply chain processes after recoding

Table B.5.1. Impact of E-Business on Customer Relationship Management

		Frequency	Valid Percent
Valid	not relevant-not beneficial-marginally beneficial	29	43.3
	beneficial-very beneficial	38	56.7
	Total	67	100.0

Table B.5.2. Impact of E-Business on marketing research

		Frequency	Valid Percent
Valid	not relevant-not beneficial-marginally beneficial	28	41.8
	beneficial-very beneficial	39	58.2
	Total	67	100.0

Table B.5.3. Impact of E-Business on management of distribution channels

		Frequency	Valid Percent
Valid	not relevant-not beneficial-marginally beneficial	41	61.2
	beneficial-very beneficial	26	38.8
	Total	67	100.0

Table B.5.4. Impact of E-Business on order processing

		Frequency	Valid Percent
Valid	not relevant-not beneficial-marginally beneficial	22	32.8
	beneficial-very beneficial	45	67.2
	Total	67	100.0

Table B.5.5. Impact of E-Business on production

		Frequency	Valid Percent
Valid	not relevant-not beneficial-marginally beneficial	30	44.8
	beneficial-very beneficial	37	55.2
	Total	67	100.0

Table B.5.6. Impact of E-Business on logistics and returns process

		Frequency	Valid Percent
Valid	not relevant-not beneficial-marginally beneficial	31	46.3
	beneficial-very beneficial	36	53.7
	Total	67	100.0

Table B.5.7. Impact of E-Business on product development

		Frequency	Valid Percent
Valid	not relevant-not beneficial-marginally beneficial	45	67.2
	beneficial-very beneficial	22	32.8
	Total	67	100.0

Table B.5.8. Impact of E-Business on planning synchronization

		Frequency	Valid Percent
Valid	not relevant-not beneficial-marginally beneficial	31	46.3
	beneficial-very beneficial	36	53.7
	Total	67	100.0

Table A.5.9. Impact of E-Business on manufacturing flow management processes

		Frequency	Valid Percent
Valid	not relevant-not beneficial-marginally beneficial	40	59.7
	beneficial-very beneficial	27	40.3
	Total	67	100.0

Table B.5.10. Impact of E-Business on lead time management

		Frequency	Valid Percent
Valid	not relevant-not beneficial-marginally beneficial	41	61.2
	beneficial-very beneficial	26	38.8
	Total	67	100.0

Table B.5.11. Impact of E-Business on inventory management

		Frequency	Valid Percent
Valid	not relevant-not beneficial-marginally beneficial	31	46.3
	beneficial-very beneficial	36	53.7
	Total	67	100.0

Table B.5.12. Impact of E-Business on procurement

		Frequency	Valid Percent
Valid	not relevant-not beneficial-marginally beneficial	28	41.8
	beneficial-very beneficial	39	58.2
	Total	67	100.0

Table B.5.13. Impact of E-Business on fulfilment

		Frequency	Valid Percent
Valid	not relevant-not beneficial-marginally beneficial	29	43.3
	beneficial-very beneficial	38	56.7
	Total	67	100.0

Table B.5.14. Impact of E-Business on demand management processes

		Frequency	Valid Percent
Valid	not relevant-not beneficial-marginally beneficial	39	58.2
	beneficial-very beneficial	28	41.8
	Total	67	100.0

Appendix C.5. Bivariate analysis of the impact of E-Business on various supply chain processes after recoding

Table C.5.1. Impact of E-Business on Customer Relationship Management * helpfulness of E-Business on supply chain integration

Crosstab

			helpfulness of E-Business on supply chain integration			Total
			not relevant-not helpful	marginally helpful	helpful-very helpful	
Impact of E-Business on Customer Relationship Management	not relevant-not beneficial-marginally beneficial	Count	11	9	7	27
		% within Impact of E-Business on Customer Relationship Management	40.7%	33.3%	25.9%	100.0%
	beneficial-very beneficial	Count	8	10	20	38
		% within Impact of E-Business on Customer Relationship Management	21.1%	26.3%	52.6%	100.0%
Total		Count	19	19	27	65
		% within Impact of E-Business on Customer Relationship Management	29.2%	29.2%	41.5%	100.0%

Table C.5.2. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.069[a]	2	.079
Likelihood Ratio	5.185	2	.075
Linear-by-Linear Association	4.830	1	.028
N of Valid Cases	65		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.89.

Table C.5.3. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.279	.079
	Cramer's V	.279	.079
N of Valid Cases		65	

Table C.5.4. Impact of E-Business on marketing research * helpfulness of E-Business on supply chain integration

Crosstab

			helpfulness of E-Business on supply chain integration			
			not relevant-not helpful	marginally helpful	helpful-very helpful	Total
Impact of E-Business on marketing research	not relevant-not beneficial-marginally beneficial	Count	8	7	12	27
		% within Impact of E-Business on marketing research	29.6%	25.9%	44.4%	100.0%
	beneficial-very beneficial	Count	11	12	15	38
		% within Impact of E-Business on marketing research	28.9%	31.6%	39.5%	100.0%
Total		Count	19	19	27	65
		% within Impact of E-Business on marketing research	29.2%	29.2%	41.5%	100.0%

Table C.5.5. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.269[a]	2	.874
Likelihood Ratio	.271	2	.873
Linear-by-Linear Association	.041	1	.839
N of Valid Cases	65		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.89.

Table C.5.6. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.064	.874
	Cramer's V	.064	.874
N of Valid Cases		65	

Table C.5.7. Impact of E-Business on order processing * helpfulness of E-Business on supply chain integration

Crosstab

			helpfulness of E-Business on supply chain integration			
			not relevant-not helpful	marginally helpful	helpful-very helpful	Total
Impact of E-Business on order processing	not relevant-not beneficial-marginally beneficial	Count	11	6	4	21
		% within Impact of E-Business on order processing	**52.4%**	28.6%	19.0%	100.0%
	beneficial-very beneficial	Count	8	13	23	44
		% within Impact of E-Business on order processing	18.2%	29.5%	**52.3%**	100.0%
Total		Count	19	19	27	65
		% within Impact of E-Business on order processing	29.2%	29.2%	41.5%	100.0%

Table C.5.8. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.470[a]	2	.009
Likelihood Ratio	9.577	2	.008
Linear-by-Linear Association	9.188	1	.002
N of Valid Cases	65		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.14.

Table C.5.9. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.382	.009
	Cramer's V	.382	.009
N of Valid Cases		65	

Table C.5.10. Impact of E-Business on production * helpfulness of E-Business on supply chain integration

Crosstab

			helpfulness of E-Business on supply chain integration			
			not relevant-not helpful	marginally helpful	helpful-very helpful	Total
Impact of E-Business on production	not relevant-not beneficial-marginally beneficial	Count	12	8	8	28
		% within Impact of E-Business on production	42.9%	28.6%	28.6%	100.0%
	beneficial-very beneficial	Count	7	11	19	37
		% within Impact of E-Business on production	18.9%	29.7%	51.4%	100.0%
Total		Count	19	19	27	65
		% within Impact of E-Business on production	29.2%	29.2%	41.5%	100.0%

Table C.5.11. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.123[a]	2	.077
Likelihood Ratio	5.171	2	.075
Linear-by-Linear Association	4.946	1	.026
N of Valid Cases	65		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.18.

Table C.5.12. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.281	.077
	Cramer's V	.281	.077
N of Valid Cases		65	

Table C.5.13. Impact of E-Business on logistics and returns process * helpfulness of E-Business on supply chain integration

Crosstab

			helpfulness of E-Business on supply chain integration			Total
			not relevant-not helpful	marginally helpful	helpful-very helpful	
Impact of E-Business on logistics and returns process	not relevant-not beneficial-marginally beneficial	Count	15	8	7	30
		% within Impact of E-Business on logistics and returns process	50.0%	26.7%	23.3%	100.0%
	beneficial-very beneficial	Count	4	11	20	35
		% within Impact of E-Business on logistics and returns process	11.4%	31.4%	57.1%	100.0%
Total		Count	19	19	27	65
		% within Impact of E-Business on logistics and returns process	29.2%	29.2%	41.5%	100.0%

Table C.5.14. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.792[a]	2	.002
Likelihood Ratio	13.400	2	.001
Linear-by-Linear Association	12.032	1	.001
N of Valid Cases	65		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.77.

Table C.5.15. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.444	.002
	Cramer's V	.444	.002
N of Valid Cases		65	

Table C.5.16. Impact of E-Business on planning synchronization * helpfulness of E-Business on supply chain integration

Crosstab

			helpfulness of E-Business on supply chain integration			
			not relevant-not helpful	marginally helpful	helpful-very helpful	Total
Impact of E-Business on planning synchronization	not relevant-not beneficial-marginally beneficial	Count	14	8	8	30
		% within Impact of E-Business on planning synchronization	46.7%	26.7%	26.7%	100.0%
	beneficial-very beneficial	Count	5	11	19	35
		% within Impact of E-Business on planning synchronization	14.3%	31.4%	54.3%	100.0%
Total		Count	19	19	27	65
		% within Impact of E-Business on planning synchronization	29.2%	29.2%	41.5%	100.0%

Table C.5.17. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.886[a]	2	.012
Likelihood Ratio	9.144	2	.010
Linear-by-Linear Association	8.268	1	.004
N of Valid Cases	65		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.77.

Table C.5.18. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.370	.012
	Cramer's V	.370	.012
N of Valid Cases		65	

Table C.5.19. Impact of E-Business on inventory management * helpfulness of E-Business on supply chain integration

Crosstab

			helpfulness of E-Business on supply chain integration			
			not relevant-not helpful	marginally helpful	helpful-very helpful	Total
Impact of E-Business on inventory management	not relevant-not beneficial-marginally beneficial	Count	13	10	8	31
		% within Impact of E-Business on inventory management	41.9%	32.3%	25.8%	100.0%
	beneficial-very beneficial	Count	6	9	19	34
		% within Impact of E-Business on inventory management	17.6%	26.5%	55.9%	100.0%
Total		Count	19	19	27	65
		% within Impact of E-Business on inventory management	29.2%	29.2%	41.5%	100.0%

Table C.5.20. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.989[a]	2	.030
Likelihood Ratio	7.169	2	.028
Linear-by-Linear Association	6.814	1	.009
N of Valid Cases	65		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.06.

Table C.5.21. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.328	.030
	Cramer's V	.328	.030
N of Valid Cases		65	

Table C.5.22. Impact of E-Business on procurement * helpfulness of E-Business on supply chain integration

Crosstab

			helpfulness of E-Business on supply chain integration			
			not relevant-not helpful	marginally helpful	helpful-very helpful	Total
Impact of E-Business on procurement	not relevant-not beneficial-marginally beneficial	Count	13	6	8	27
		% within Impact of E-Business on procurement	48.1%	22.2%	29.6%	100.0%
	beneficial-very beneficial	Count	6	13	19	38
		% within Impact of E-Business on procurement	15.8%	34.2%	50.0%	100.0%
Total		Count	19	19	27	65
		% within Impact of E-Business on procurement	29.2%	29.2%	41.5%	100.0%

Table C.5.23. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.007[a]	2	.018
Likelihood Ratio	8.025	2	.018
Linear-by-Linear Association	6.240	1	.012
N of Valid Cases	65		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.89.

Table C.5.24. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.351	.018
	Cramer's V	.351	.018
N of Valid Cases		65	

Table C.5.25. Impact of E-Business on fulfilment * helpfulness of E-Business on supply chain integration

Crosstab

			helpfulness of E-Business on supply chain integration			Total
			not relevant-not helpful	marginally helpful	helpful-very helpful	
Impact of E-Business on fulfilment	not relevant-not beneficial-marginally beneficial	Count	12	6	10	28
		% within Impact of E-Business on fulfilment	42.9%	21.4%	35.7%	100.0%
	beneficial-very beneficial	Count	7	13	17	37
		% within Impact of E-Business on fulfilment	18.9%	35.1%	45.9%	100.0%
Total		Count	19	19	27	65
		% within Impact of E-Business on fulfilment	29.2%	29.2%	41.5%	100.0%

Table C.5.26. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.551[a]	2	.103
Likelihood Ratio	4.558	2	.102
Linear-by-Linear Association	2.646	1	.104
N of Valid Cases	65		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.18.

Table C.5.27. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.265	.103
	Cramer's V	.265	.103
N of Valid Cases		65	

Appendix D.5. Univariate analysis of barriers of electronic supply chain adoption, after recoding

Table D.5.1. The barrier of security and privacy concerns

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not a constraint	26	38.8	38.8	38.8
	moderate constraint	25	37.3	37.3	76.1
	strong constraint	16	23.9	23.9	100.0
	Total	67	100.0	100.0	

Table D.5.2. The barrier of being unaware of the potential of ICTs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not a constraint	29	43.3	43.3	43.3
	moderate constraint	20	29.9	29.9	73.1
	strong constraint	18	26.9	26.9	100.0
	Total	67	100.0	100.0	

Table D.5.3. The barrier of low supplier E-Business use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not a constraint	28	41.8	42.4	42.4
	moderate constraint	18	26.9	27.3	69.7
	strong constraint	20	29.9	30.3	100.0
	Total	66	98.5	100.0	
Missing	System	1	1.5		
Total		67	100.0		

Table D.5.4. The barrier of high cost of networking technologies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not a constraint	27	40.3	40.3	40.3
	moderate constraint	21	31.3	31.3	71.6
	strong constraint	19	28.4	28.4	100.0
	Total	67	100.0	100.0	

Table D.5.5. The barrier of lack of IT knowledge and skills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not a constraint	27	40.3	40.3	40.3
	moderate constraint	27	40.3	40.3	80.6
	strong constraint	13	19.4	19.4	100.0
	Total	67	100.0	100.0	

Table D.5.6. The barrier of high operation costs of ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not a constraint	33	49.3	49.3	49.3
	moderate constraint	28	41.8	41.8	91.0
	strong constraint	6	9.0	9.0	100.0
	Total	67	100.0	100.0	

Table D.5.7. The barrier of high costs of research in the area of IT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not a constraint	31	46.3	46.3	46.3
	moderate constraint	30	44.8	44.8	91.0
	strong constraint	6	9.0	9.0	100.0
	Total	67	100.0	100.0	

Table D.5.8. The barrier of being unconvinced of the benefits of E-Business

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not a constraint	41	61.2	62.1	62.1
	moderate constraint	19	28.4	28.8	90.9
	strong constraint	6	9.0	9.1	100.0
	Total	66	98.5	100.0	
Missing	System	1	1.5		
Total		67	100.0		

Table D.5.9. The barrier of conducting business in defined niche markets

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not a constraint	40	59.7	60.6	60.6
	moderate constraint	14	20.9	21.2	81.8
	strong constraint	12	17.9	18.2	100.0
	Total	66	98.5	100.0	
Missing	System	1	1.5		
Total		67	100.0		

Table D.5.10. The barrier of limited network bandwidth

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not a constraint	46	68.7	68.7	68.7
	moderate constraint	13	19.4	19.4	88.1
	strong constraint	8	11.9	11.9	100.0
	Total	67	100.0	100.0	

Table D.5.11. The barrier of unreliable and inconsistent network

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not a constraint	48	71.6	71.6	71.6
	moderate constraint	13	19.4	19.4	91.0
	strong constraint	6	9.0	9.0	100.0
	Total	67	100.0	100.0	

Table D.5.12. The barrier of difficulty and high costs of outsourcing IT activities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not a constraint	41	61.2	61.2	61.2
	moderate constraint	16	23.9	23.9	85.1
	strong constraint	10	14.9	14.9	100.0
	Total	67	100.0	100.0	

Table D.5.13. The barrier of lack of personnel to implement ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not a constraint	31	46.3	46.3	46.3
	moderate constraint	27	40.3	40.3	86.6
	strong constraint	9	13.4	13.4	100.0
	Total	67	100.0	100.0	

Appendix E.5. Bivariate analysis of barriers of electronic supply chain adoption, after first recoding

Table E.5.1. Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
The barrier of security and privacy concerns * Success of the company in implementation of the E-Business	67	100.0%	0	0.0%	67	100.0%
The barrier of being unaware of the potential of ICTs * Success of the company in implementation of the E-Business	67	100.0%	0	0.0%	67	100.0%
The barrier of low supplier E-Business use * Success of the company in implementation of the E-Business	66	98.5%	1	1.5%	67	100.0%
The barrier of high cost of networking technologies * Success of the company in implementation of the E-Business	67	100.0%	0	0.0%	67	100.0%
The barrier of lack of IT knowledge and skills * Success of the company in implementation of the E-Business	67	100.0%	0	0.0%	67	100.0%
The barrier of high operation costs of ICT * Success of the company in implementation of the E-Business	67	100.0%	0	0.0%	67	100.0%
The barrier of high costs of research in the area of IT * Success of the company in implementation of the E-Business	67	100.0%	0	0.0%	67	100.0%
The barrier of being unconvinced of the benefits of E-Business * Success of the company in implementation of the E-Business	66	98.5%	1	1.5%	67	100.0%
The barrier of conducting business in defined niche markets * Success of the company in implementation of the E-Business	66	98.5%	1	1.5%	67	100.0%
The barrier of limited network bandwidth * Success of the company in implementation of the E-Business	67	100.0%	0	0.0%	67	100.0%
The barrier of unreliable and inconsistent network * Success of the company in implementation of the E-Business	67	100.0%	0	0.0%	67	100.0%
The barrier of difficulty and high costs of outsourcing IT activities * Success of the company in implementation of the E-Business	67	100.0%	0	0.0%	67	100.0%
The barrier of lack of personnel to implement ICT * Success of the company in implementation of the E-Business	67	100.0%	0	0.0%	67	100.0%

Table E.5.2. The barrier of security and privacy concerns * Success of the company in implementation of the E-Business

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of security and privacy concerns	not relevant-not a constraint	Count	15	11	26
		% within The barrier of security and privacy concerns	57.7%	42.3%	100.0%
	moderate constraint	Count	11	14	25
		% within The barrier of security and privacy concerns	44.0%	56.0%	100.0%
	strong constraint	Count	9	7	16
		% within The barrier of security and privacy concerns	56.2%	43.8%	100.0%
Total		Count	35	32	67
		% within The barrier of security and privacy concerns	52.2%	47.8%	100.0%

Table E.5.3. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.093a	2	.579
Likelihood Ratio	1.095	2	.578
Linear-by-Linear Association	.059	1	.809
N of Valid Cases	67		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.64.

Table E.5.4. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.128	.579
	Cramer's V	.128	.579
N of Valid Cases		67	

Table E.5.5. The barrier of being unaware of the potential of ICTs * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of being unaware of the potential of ICTs	not relevant-not a constraint	Count	19	10	29
		% within The barrier of being unaware of the potential of ICTs	65.5%	34.5%	100.0%
	moderate constraint	Count	11	9	20
		% within The barrier of being unaware of the potential of ICTs	55.0%	45.0%	100.0%
	strong constraint	Count	5	13	18
		% within The barrier of being unaware of the potential of ICTs	27.8%	72.2%	100.0%
Total		Count	35	32	67
		% within The barrier of being unaware of the potential of ICTs	52.2%	47.8%	100.0%

Table E.5.6. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.427a	2	.040
Likelihood Ratio	6.589	2	.037
Linear-by-Linear Association	5.951	1	.015
N of Valid Cases	67		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.60.

Table E.5.7. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.310	.040
	Cramer's V	.310	.040
N of Valid Cases		67	

Table E.5.8. The barrier of low supplier E-Business use * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of low supplier E-Business use	not relevant-not a constraint	Count	16	12	28
		% within The barrier of low supplier E-Business use	57.1%	42.9%	100.0%
	moderate constraint	Count	13	5	18
		% within The barrier of low supplier E-Business use	72.2%	27.8%	100.0%
	strong constraint	Count	6	14	20
		% within The barrier of low supplier E-Business use	30.0%	70.0%	100.0%
Total		Count	35	31	66
		% within The barrier of low supplier E-Business use	53.0%	47.0%	100.0%

Table E.5.9. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.111a	2	.029
Likelihood Ratio	7.305	2	.026
Linear-by-Linear Association	2.787	1	.095
N of Valid Cases	66		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.45.

Table E.5.10. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.328	.029
	Cramer's V	.328	.029
N of Valid Cases		66	

Table E.5.11. The barrier of high cost of networking technologies * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of high cost of networking technologies	not relevant-not a constraint	Count	14	13	27
		% within The barrier of high cost of networking technologies	51.9%	48.1%	100.0%
	moderate constraint	Count	11	10	21
		% within The barrier of high cost of networking technologies	52.4%	47.6%	100.0%
	strong constraint	Count	10	9	19
		% within The barrier of high cost of networking technologies	52.6%	47.4%	100.0%
Total		Count	35	32	67
		% within The barrier of high cost of networking technologies	52.2%	47.8%	100.0%

Table E.5.12. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.003a	2	.999
Likelihood Ratio	.003	2	.999
Linear-by-Linear Association	.003	1	.958
N of Valid Cases	67		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.07.

Table E.5.13. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.007	.999
	Cramer's V	.007	.999
N of Valid Cases		67	

Table E.5.14. The barrier of lack of IT knowledge and skills * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of lack of IT knowledge and skills	not relevant-not a constraint	Count	18	9	27
		% within The barrier of lack of IT knowledge and skills	66.7%	33.3%	100.0%
	moderate constraint	Count	14	13	27
		% within The barrier of lack of IT knowledge and skills	51.9%	48.1%	100.0%
	strong constraint	Count	3	10	13
		% within The barrier of lack of IT knowledge and skills	23.1%	76.9%	100.0%
Total		Count	35	32	67
		% within The barrier of lack of IT knowledge and skills	52.2%	47.8%	100.0%

Table E.5.15. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.685a	2	.035
Likelihood Ratio	6.937	2	.031
Linear-by-Linear Association	6.292	1	.012
N of Valid Cases	67		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.21.

Table E.5.16. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.316	.035
	Cramer's V	.316	.035
N of Valid Cases		67	

Table E.5.17. The barrier of high operation costs of ICT * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of high operation costs of ICT	not relevant-not a constraint	Count	19	14	33
		% within The barrier of high operation costs of ICT	57.6%	42.4%	100.0%
	moderate constraint	Count	13	15	28
		% within The barrier of high operation costs of ICT	46.4%	53.6%	100.0%
	strong constraint	Count	3	3	6
		% within The barrier of high operation costs of ICT	50.0%	50.0%	100.0%
Total		Count	35	32	67
		% within The barrier of high operation costs of ICT	52.2%	47.8%	100.0%

Table E.5.18. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.768a	2	.681
Likelihood Ratio	.769	2	.681
Linear-by-Linear Association	.504	1	.478
N of Valid Cases	67		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 2.87.

Table E.5.19. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.107	.681
	Cramer's V	.107	.681
N of Valid Cases		67	

Table E.5.20. The barrier of high costs of research in the area of IT * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of high costs of research in the area of IT	not relevant-not a constraint	Count	19	12	31
		% within The barrier of high costs of research in the area of IT	61.3%	38.7%	100.0%
	moderate constraint	Count	15	15	30
		% within The barrier of high costs of research in the area of IT	50.0%	50.0%	100.0%
	strong constraint	Count	1	5	6
		% within The barrier of high costs of research in the area of IT	16.7%	83.3%	100.0%
Total		Count	35	32	67
		% within The barrier of high costs of research in the area of IT	52.2%	47.8%	100.0%

Table E.5.21. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.121a	2	.127
Likelihood Ratio	4.371	2	.112
Linear-by-Linear Association	3.482	1	.062
N of Valid Cases	67		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 2.87.

Table E.5.22. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.248	.127
	Cramer's V	.248	.127
N of Valid Cases		67	

Table E.5.23. The barrier of being unconvinced of the benefits of E-Business * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of being unconvinced of the benefits of E-Business	not relevant-not a constraint	Count	24	17	41
		% within The barrier of being unconvinced of the benefits of E-Business	58.5%	41.5%	100.0%
	moderate constraint	Count	11	8	19
		% within The barrier of being unconvinced of the benefits of E-Business	57.9%	42.1%	100.0%
	strong constraint	Count	0	6	6
		% within The barrier of being unconvinced of the benefits of E-Business	0.0%	100.0%	100.0%
Total		Count	35	31	66
		% within The barrier of being unconvinced of the benefits of E-Business	53.0%	47.0%	100.0%

Table E.5.24. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.454a	2	.024
Likelihood Ratio	9.752	2	.008
Linear-by-Linear Association	4.113	1	.043
N of Valid Cases	66		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 2.82.

Table E.5.25. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.336	.024
	Cramer's V	.336	.024
N of Valid Cases		66	

Table E.5.26. The barrier of conducting business in defined niche markets * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of conducting business in defined niche markets	not relevant-not a constraint	Count	27	13	40
		% within The barrier of conducting business in defined niche markets	67.5%	32.5%	100.0%
	moderate constraint	Count	4	10	14
		% within The barrier of conducting business in defined niche markets	28.6%	71.4%	100.0%
	strong constraint	Count	3	9	12
		% within The barrier of conducting business in defined niche markets	25.0%	75.0%	100.0%
Total		Count	34	32	66
		% within The barrier of conducting business in defined niche markets	51.5%	48.5%	100.0%

Table E.5.27. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.420a	2	.005
Likelihood Ratio	10.741	2	.005
Linear-by-Linear Association	9.012	1	.003
N of Valid Cases	66		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.82.

Table E.5.28. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.397	.005
	Cramer's V	.397	.005
N of Valid Cases		66	

Table E.5.29. The barrier of limited network bandwidth * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of limited network bandwidth	not relevant-not a constraint	Count	23	23	46
		% within The barrier of limited network bandwidth	50.0%	50.0%	100.0%
	moderate constraint	Count	9	4	13
		% within The barrier of limited network bandwidth	69.2%	30.8%	100.0%
	strong constraint	Count	3	5	8
		% within The barrier of limited network bandwidth	37.5%	62.5%	100.0%
Total		Count	35	32	67
		% within The barrier of limited network bandwidth	52.2%	47.8%	100.0%

Table E.5.30. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.293a	2	.318
Likelihood Ratio	2.345	2	.310
Linear-by-Linear Association	.003	1	.958
N of Valid Cases	67		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 3.82.

Table E.5.31. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.185	.318
	Cramer's V	.185	.318
N of Valid Cases		67	

Table E.5.32. The barrier of unreliable and inconsistent network * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of unreliable and inconsistent network	not relevant-not a constraint	Count	24	24	48
		% within The barrier of unreliable and inconsistent network	50.0%	50.0%	100.0%
	moderate constraint	Count	8	5	13
		% within The barrier of unreliable and inconsistent network	61.5%	38.5%	100.0%
	strong constraint	Count	3	3	6
		% within The barrier of unreliable and inconsistent network	50.0%	50.0%	100.0%
Total		Count	35	32	67
		% within The barrier of unreliable and inconsistent network	52.2%	47.8%	100.0%

Table E.5.33. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.559a	2	.756
Likelihood Ratio	.564	2	.754
Linear-by-Linear Association	.126	1	.722
N of Valid Cases	67		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 2.87.

Table E.5.34. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.091	.756
	Cramer's V	.091	.756
N of Valid Cases		67	

Table E.5.35. The barrier of difficulty and high costs of outsourcing IT activities * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of difficulty and high costs of outsourcing IT activities	not relevant-not a constraint	Count	27	14	41
		% within The barrier of difficulty and high costs of outsourcing IT activities	65.9%	34.1%	100.0%
	moderate constraint	Count	5	11	16
		% within The barrier of difficulty and high costs of outsourcing IT activities	31.2%	68.8%	100.0%
	strong constraint	Count	3	7	10
		% within The barrier of difficulty and high costs of outsourcing IT activities	30.0%	70.0%	100.0%
Total		Count	35	32	67
		% within The barrier of difficulty and high costs of outsourcing IT activities	52.2%	47.8%	100.0%

Table E.5.36. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.853a	2	.020
Likelihood Ratio	8.011	2	.018
Linear-by-Linear Association	6.563	1	.010
N of Valid Cases	67		

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 4.78.

Table E.5.37. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.342	.020
	Cramer's V	.342	.020
N of Valid Cases		67	

Table E.5.38. The barrier of lack of personnel to implement ICT * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of lack of personnel to implement ICT	not relevant-not a constraint	Count	23	8	31
		% within The barrier of lack of personnel to implement ICT	74.2%	25.8%	100.0%
	moderate constraint	Count	9	18	27
		% within The barrier of lack of personnel to implement ICT	33.3%	66.7%	100.0%
	strong constraint	Count	3	6	9
		% within The barrier of lack of personnel to implement ICT	33.3%	66.7%	100.0%
Total		Count	35	32	67
		% within The barrier of lack of personnel to implement ICT	52.2%	47.8%	100.0%

Table E.5.39. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.146a	2	.004
Likelihood Ratio	11.515	2	.003
Linear-by-Linear Association	8.719	1	.003
N of Valid Cases	67		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 4.30.

Table E.5.40. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.408	.004
	Cramer's V	.408	.004
N of Valid Cases		67	

Appendix F.5. Bivariate analysis of barriers of electronic supply chain adoption, after second recoding

Table F.5.1. The barrier of security and privacy concerns * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of security and privacy concerns	not relevant-not a constraint-moderate constraint	Count	26	25	51
		% within The barrier of security and privacy concerns	51.0%	49.0%	100.0%
	strong constraint	Count	9	7	16
		% within The barrier of security and privacy concerns	56.2%	43.8%	100.0%
Total		Count	35	32	67
		% within The barrier of security and privacy concerns	52.2%	47.8%	100.0%

Table F.5.2. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.136[a]	1	.713		
Continuity Correction[b]	.007	1	.935		
Likelihood Ratio	.136	1	.712		
Fisher's Exact Test				.780	.469
Linear-by-Linear Association	.134	1	.715		
N of Valid Cases	67				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.64.

b. Computed only for a 2x2 Table

Table F.5.3. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.045	.713
	Cramer's V	.045	.713
N of Valid Cases		67	

Table F.5.4. The barrier of being unaware of the potential of ICTs * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of being unaware of the potential of ICTs	not relevant-not a constraint-moderate constraint	Count	30	19	49
		% within The barrier of being unaware of the potential of ICTs	61.2%	38.8%	100.0%
	strong constraint	Count	5	13	18
		% within The barrier of being unaware of the potential of ICTs	27.8%	72.2%	100.0%
Total		Count	35	32	67
		% within The barrier of being unaware of the potential of ICTs	52.2%	47.8%	100.0%

Table F.5.5. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.902[a]	1	.015		
Continuity Correction[b]	4.638	1	.031		
Likelihood Ratio	6.039	1	.014		
Fisher's Exact Test				.026	.015
Linear-by-Linear Association	5.814	1	.016		
N of Valid Cases	67				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.60.

b. Computed only for a 2x2 Table

Table F.5.6. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.297	.015
	Cramer's V	.297	.015
N of Valid Cases		67	

Table F.5.7. The barrier of low supplier E-Business use * Success of the company in implementation of the E-Business

Table F.5.7. Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of low supplier E-Business use	not relevant-not a constraint-moderate constraint	Count	29	17	46
		% within The barrier of low supplier E-Business use	63.0%	37.0%	100.0%
	strong constraint	Count	6	14	20
		% within The barrier of low supplier E-Business use	30.0%	70.0%	100.0%
Total		Count	35	31	66
		% within The barrier of low supplier E-Business use	53.0%	47.0%	100.0%

Table F.5.8. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.110[a]	1	.013		
Continuity Correction[b]	4.856	1	.028		
Likelihood Ratio	6.216	1	.013		
Fisher's Exact Test				.017	.013
Linear-by-Linear Association	6.018	1	.014		
N of Valid Cases	66				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.39.

b. Computed only for a 2x2 Table

Table F.5.9. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.304	.013
	Cramer's V	.304	.013
N of Valid Cases		66	

Table F.5.10. The barrier of high cost of networking technologies * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of high cost of networking technologies	not relevant-not a constraint-moderate constraint	Count	25	23	48
		% within The barrier of high cost of networking technologies	52.1%	47.9%	100.0%
	strong constraint	Count	10	9	19
		% within The barrier of high cost of networking technologies	52.6%	47.4%	100.0%
Total		Count	35	32	67
		% within The barrier of high cost of networking technologies	52.2%	47.8%	100.0%

Table F.5.11. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.002[a]	1	.968		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.002	1	.968		
Fisher's Exact Test				1.000	.592
Linear-by-Linear Association	.002	1	.968		
N of Valid Cases	67				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.07.

b. Computed only for a 2x2 Table

Table F.5.12. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.005	.968
	Cramer's V	.005	.968
N of Valid Cases		67	

Table F.5.13. The barrier of lack of IT knowledge and skills * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of lack of IT knowledge and skills	not relevant-not a constraint-moderate constraint	Count	32	22	54
		% within The barrier of lack of IT knowledge and skills	59.3%	40.7%	100.0%
	strong constraint	Count	3	10	13
		% within The barrier of lack of IT knowledge and skills	23.1%	76.9%	100.0%
Total		Count	35	32	67
		% within The barrier of lack of IT knowledge and skills	52.2%	47.8%	100.0%

Table F.5.14. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.498[a]	1	.019		
Continuity Correction[b]	4.143	1	.042		
Likelihood Ratio	5.705	1	.017		
Fisher's Exact Test				.029	.020
Linear-by-Linear Association	5.416	1	.020		
N of Valid Cases	67				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.21.

b. Computed only for a 2x2 Table

Table F.5.15. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.286	.019
	Cramer's V	.286	.019
N of Valid Cases		67	

Table F.5.16. The barrier of high operation costs of ICT * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of high operation costs of ICT	not relevant-not a constraint-moderate constraint	Count	32	29	61
		% within The barrier of high operation costs of ICT	52.5%	47.5%	100.0%
	strong constraint	Count	3	3	6
		% within The barrier of high operation costs of ICT	50.0%	50.0%	100.0%
Total		Count	35	32	67
		% within The barrier of high operation costs of ICT	52.2%	47.8%	100.0%

Table F.5.17. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.013[a]	1	.908		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.013	1	.908		
Fisher's Exact Test				1.000	.619
Linear-by-Linear Association	.013	1	.909		
N of Valid Cases	67				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.87.

b. Computed only for a 2x2 Table

Table F.5.18. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.014	.908
	Cramer's V	.014	.908
N of Valid Cases		67	

Table F.5.19. The barrier of high costs of research in the area of IT * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of high costs of research in the area of IT	not relevant-not a constraint-moderate constraint	Count	34	27	61
		% within The barrier of high costs of research in the area of IT	55.7%	44.3%	100.0%
	strong constraint	Count	1	5	6
		% within The barrier of high costs of research in the area of IT	16.7%	83.3%	100.0%
Total		Count	35	32	67
		% within The barrier of high costs of research in the area of IT	52.2%	47.8%	100.0%

Table F.5.20. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.342[a]	1	.068		
Continuity Correction[b]	1.960	1	.162		
Likelihood Ratio	3.582	1	.058		
Fisher's Exact Test				.096	.080
Linear-by-Linear Association	3.292	1	.070		
N of Valid Cases	67				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.87.

b. Computed only for a 2x2 Table

Table F.5.21. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.223	.068
	Cramer's V	.223	.068
N of Valid Cases		67	

Table F.5.22. The barrier of being unconvinced of the benefits of E-Business * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of being unconvinced of the benefits of E-Business	not relevant-not a constraint-moderate constraint	Count	35	25	60
		% within The barrier of being unconvinced of the benefits of E-Business	58.3%	41.7%	100.0%
	strong constraint	Count	0	6	6
		% within The barrier of being unconvinced of the benefits of E-Business	0.0%	100.0%	100.0%
Total		Count	35	31	66
		% within The barrier of being unconvinced of the benefits of E-Business	53.0%	47.0%	100.0%

Table F.5.23. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.452[a]	1	.006		
Continuity Correction[b]	5.294	1	.021		
Likelihood Ratio	9.750	1	.002		
Fisher's Exact Test				.008	.008
Linear-by-Linear Association	7.339	1	.007		
N of Valid Cases	66				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.82.

b. Computed only for a 2x2 Table

Table F.5.24. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.336	.006
	Cramer's V	.336	.006
N of Valid Cases		66	

Table F.5.25. The barrier of conducting business in defined niche markets * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of conducting business in defined niche markets	not relevant-not a constraint-moderate constraint	Count	31	23	54
		% within The barrier of conducting business in defined niche markets	57.4%	42.6%	100.0%
	strong constraint	Count	3	9	12
		% within The barrier of conducting business in defined niche markets	25.0%	75.0%	100.0%
Total		Count	34	32	66
		% within The barrier of conducting business in defined niche markets	51.5%	48.5%	100.0%

Table F.5.26. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.128[a]	1	.042		
Continuity Correction[b]	2.933	1	.087		
Likelihood Ratio	4.268	1	.039		
Fisher's Exact Test				.058	.042
Linear-by-Linear Association	4.066	1	.044		
N of Valid Cases	66				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.82.

b. Computed only for a 2x2 Table

Table F.5.27. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.250	.042
	Cramer's V	.250	.042
N of Valid Cases		66	

Table F.5.28. The barrier of limited network bandwidth * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of limited network bandwidth	not relevant-not a constraint-moderate constraint	Count	32	27	59
		% within The barrier of limited network bandwidth	54.2%	45.8%	100.0%
	strong constraint	Count	3	5	8
		% within The barrier of limited network bandwidth	37.5%	62.5%	100.0%
Total		Count	35	32	67
		% within The barrier of limited network bandwidth	52.2%	47.8%	100.0%

Table F.5.29. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.791[a]	1	.374		
Continuity Correction[b]	.262	1	.608		
Likelihood Ratio	.795	1	.373		
Fisher's Exact Test				.464	.304
Linear-by-Linear Association	.779	1	.377		
N of Valid Cases	67				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.82.

b. Computed only for a 2x2 Table

Table F.5.30. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.109	.374
	Cramer's V	.109	.374
N of Valid Cases		67	

Table F.5.31. The barrier of unreliable and inconsistent network * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of unreliable and inconsistent network	not relevant-not a constraint-moderate constraint	Count	32	29	61
		% within The barrier of unreliable and inconsistent network	52.5%	47.5%	100.0%
	strong constraint	Count	3	3	6
		% within The barrier of unreliable and inconsistent network	50.0%	50.0%	100.0%
Total		Count	35	32	67
		% within The barrier of unreliable and inconsistent network	52.2%	47.8%	100.0%

Table F.5.32. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.013[a]	1	.908		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.013	1	.908		
Fisher's Exact Test				1.000	.619
Linear-by-Linear Association	.013	1	.909		
N of Valid Cases	67				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.87.

b. Computed only for a 2x2 Table

Table F.5.33. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.014	.908
	Cramer's V	.014	.908
N of Valid Cases		67	

Table F.5.34. The barrier of difficulty and high costs of outsourcing IT activities * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of difficulty and high costs of outsourcing IT activities	not relevant-not a constraint-moderate constraint	Count	32	25	57
		% within The barrier of difficulty and high costs of outsourcing IT activities	56.1%	43.9%	100.0%
	strong constraint	Count	3	7	10
		% within The barrier of difficulty and high costs of outsourcing IT activities	30.0%	70.0%	100.0%
Total		Count	35	32	67
		% within The barrier of difficulty and high costs of outsourcing IT activities	52.2%	47.8%	100.0%

Table F.5.35. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.330[a]	1	.127		
Continuity Correction[b]	1.400	1	.237		
Likelihood Ratio	2.373	1	.123		
Fisher's Exact Test				.175	.118
Linear-by-Linear Association	2.295	1	.130		
N of Valid Cases	67				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.78.

b. Computed only for a 2x2 Table

Table F.5.36. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.186	.127
	Cramer's V	.186	.127
N of Valid Cases		67	

Table F.5.37. The barrier of lack of personnel to implement ICT * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
The barrier of lack of personnel to implement ICT	not relevant-not a constraint-moderate constraint	Count	32	26	58
		% within The barrier of lack of personnel to implement ICT	55.2%	44.8%	100.0%
	strong constraint	Count	3	6	9
		% within The barrier of lack of personnel to implement ICT	33.3%	66.7%	100.0%
Total		Count	35	32	67
		% within The barrier of lack of personnel to implement ICT	52.2%	47.8%	100.0%

Table F.5.38. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.489[a]	1	.222		
Continuity Correction[b]	.743	1	.389		
Likelihood Ratio	1.507	1	.220		
Fisher's Exact Test				.292	.195
Linear-by-Linear Association	1.467	1	.226		
N of Valid Cases	67				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 4.30.

b. Computed only for a 2x2 Table

Table F.5.39. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.149	.222
	Cramer's V	.149	.222
N of Valid Cases		67	

Appendix G.5. Univariate analysis of the benefits of E-Business

Table. G.5.1. E-Business benefit of improved supply chain management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	5	7.5	7.5	7.5
	not beneficial	7	10.4	10.4	17.9
	marginally beneficial	23	34.3	34.3	52.2
	beneficial	23	34.3	34.3	86.6
	very beneficial	9	13.4	13.4	100.0
	Total	67	100.0	100.0	

Table. G.5.2. E-Business benefit of increased revenues

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	5	7.5	7.5	7.5
	not beneficial	10	14.9	14.9	22.4
	marginally beneficial	29	43.3	43.3	65.7
	beneficial	16	23.9	23.9	89.6
	very beneficial	7	10.4	10.4	100.0
	Total	67	100.0	100.0	

Table. G.5.3. E-Business benefit of lower production cycle time

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	9	13.4	13.4	13.4
	not beneficial	20	29.9	29.9	43.3
	marginally beneficial	19	28.4	28.4	71.6
	beneficial	16	23.9	23.9	95.5
	very beneficial	3	4.5	4.5	100.0
	Total	67	100.0	100.0	

`Table. G.5.4. E-Business benefit of improved customer service

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	3	4.5	4.5	4.5
	not beneficial	3	4.5	4.5	9.0
	marginally beneficial	11	16.4	16.4	25.4
	beneficial	32	47.8	47.8	73.1
	very beneficial	18	26.9	26.9	100.0
	Total	67	100.0	100.0	

Table. G.5.5. E-Business benefit of enhanced customer satisfaction

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	2	3.0	3.0	3.0
	not beneficial	3	4.5	4.5	7.5
	marginally beneficial	17	25.4	25.4	32.8
	beneficial	28	41.8	41.8	74.6
	very beneficial	17	25.4	25.4	100.0
	Total	67	100.0	100.0	

Table. G.5.6. E-Business benefit of enhanced competitive advantage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	4	6.0	6.0	6.0
	not beneficial	8	11.9	11.9	17.9
	marginally beneficial	18	26.9	26.9	44.8
	beneficial	27	40.3	40.3	85.1
	very beneficial	10	14.9	14.9	100.0
	Total	67	100.0	100.0	

Table. G.5.7. E-Business benefit of expanded market share

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	5	7.5	7.5	7.5
	not beneficial	11	16.4	16.4	23.9
	marginally beneficial	19	28.4	28.4	52.2
	beneficial	17	25.4	25.4	77.6
	very beneficial	15	22.4	22.4	100.0
	Total	67	100.0	100.0	

Table. G.5.8. E-Business benefit of creating interactive relationships with suppliers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	9	13.4	13.4	13.4
	not beneficial	11	16.4	16.4	29.9
	marginally beneficial	24	35.8	35.8	65.7
	beneficial	14	20.9	20.9	86.6
	very beneficial	9	13.4	13.4	100.0
	Total	67	100.0	100.0	

Table. G.5.9. E-Business benefit of creating interactive relationships with customers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	5	7.5	7.5	7.5
	not beneficial	7	10.4	10.4	17.9
	marginally beneficial	17	25.4	25.4	43.3
	beneficial	26	38.8	38.8	82.1
	very beneficial	12	17.9	17.9	100.0
	Total	67	100.0	100.0	

Table. G.5.10. E-Business benefit of improved delivery of products

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	7	10.4	10.4	10.4
	not beneficial	14	20.9	20.9	31.3
	marginally beneficial	19	28.4	28.4	59.7
	beneficial	20	29.9	29.9	89.6
	very beneficial	7	10.4	10.4	100.0
	Total	67	100.0	100.0	

Table. G.5.11. E-Business benefit of improved understanding of market

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	9	13.4	13.4	13.4
	not beneficial	9	13.4	13.4	26.9
	marginally beneficial	26	38.8	38.8	65.7
	beneficial	15	22.4	22.4	88.1
	very beneficial	8	11.9	11.9	100.0
	Total	67	100.0	100.0	

Table. G.5.12. E-Business benefit of cost reductions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	9	13.4	13.4	13.4
	not beneficial	13	19.4	19.4	32.8
	marginally beneficial	24	35.8	35.8	68.7
	beneficial	15	22.4	22.4	91.0
	very beneficial	6	9.0	9.0	100.0
	Total	67	100.0	100.0	

Table. G.5.13. E-Business benefit of reduced inventory level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	10	14.9	14.9	14.9
	not beneficial	16	23.9	23.9	38.8
	marginally beneficial	18	26.9	26.9	65.7
	beneficial	14	20.9	20.9	86.6
	very beneficial	9	13.4	13.4	100.0
	Total	67	100.0	100.0	

Table. G.5.14. E-Business benefit of improved planning

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	8	11.9	11.9	11.9
	not beneficial	10	14.9	14.9	26.9
	marginally beneficial	19	28.4	28.4	55.2
	beneficial	21	31.3	31.3	86.6
	very beneficial	9	13.4	13.4	100.0
	Total	67	100.0	100.0	

Table. G.5.15. E-Business benefit of collaborative inter organisational relationship

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	14	20.9	20.9	20.9
	not beneficial	9	13.4	13.4	34.3
	marginally beneficial	23	34.3	34.3	68.7
	beneficial	17	25.4	25.4	94.0
	very beneficial	4	6.0	6.0	100.0
	Total	67	100.0	100.0	

Table. G.5.16. E-Business benefit of improved information sharing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	2	3.0	3.0	3.0
	not beneficial	7	10.4	10.4	13.4
	marginally beneficial	14	20.9	20.9	34.3
	beneficial	23	34.3	34.3	68.7
	very beneficial	21	31.3	31.3	100.0
	Total	67	100.0	100.0	

Table. G.5.17. E-Business benefit of productivity and efficiency improvements

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	8	11.9	11.9	11.9
	not beneficial	11	16.4	16.4	28.4
	marginally beneficial	19	28.4	28.4	56.7
	beneficial	24	35.8	35.8	92.5
	very beneficial	5	7.5	7.5	100.0
	Total	67	100.0	100.0	

Table. G.5.18. E-Business benefit of improved product flow management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	7	10.4	10.4	10.4
	not beneficial	6	9.0	9.0	19.4
	marginally beneficial	22	32.8	32.8	52.2
	beneficial	26	38.8	38.8	91.0
	very beneficial	6	9.0	9.0	100.0
	Total	67	100.0	100.0	

Table. G.5.19. E-Business benefit of lower transaction costs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	7	10.4	11.1	11.1
	not beneficial	13	19.4	20.6	31.7
	marginally beneficial	27	40.3	42.9	74.6
	beneficial	10	14.9	15.9	90.5
	very beneficial	6	9.0	9.5	100.0
	Total	63	94.0	100.0	
Missing	System	4	6.0		
Total		67	100.0		

Table. G.5.20. E-Business benefit of improved forecasting and planning

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	6	9.0	9.1	9.1
	not beneficial	9	13.4	13.6	22.7
	marginally beneficial	19	28.4	28.8	51.5
	beneficial	23	34.3	34.8	86.4
	very beneficial	9	13.4	13.6	100.0
	Total	66	98.5	100.0	
Missing	System	1	1.5		
Total		67	100.0		

Appendix H.5. Univariate analysis of benefits of E-Business after recoding

H.5.1. E-Business benefit of improved customer service

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not beneficial	6	9.0	9.0	9.0
	marginally beneficial	11	16.4	16.4	25.4
	beneficial-very beneficial	50	74.6	74.6	100.0
	Total	67	100.0	100.0	

H.5.2. E-Business benefit of enhanced customer satisfaction

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not beneficial	5	7.5	7.5	7.5
	marginally beneficial	17	25.4	25.4	32.8
	beneficial-very beneficial	45	67.2	67.2	100.0
	Total	67	100.0	100.0	

H.5.3. E-Business benefit of enhanced competitive advantage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not beneficial	12	17.9	17.9	17.9
	marginally beneficial	18	26.9	26.9	44.8
	beneficial-very beneficial	37	55.2	55.2	100.0
	Total	67	100.0	100.0	

H.5.4. E-Business benefit of creating interactive relationships with suppliers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not beneficial	20	29.9	29.9	29.9
	marginally beneficial	24	35.8	35.8	65.7
	beneficial-very beneficial	23	34.3	34.3	100.0
	Total	67	100.0	100.0	

H.5.5. E-Business benefit of creating interactive relationships with customers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not beneficial	12	17.9	17.9	17.9
	marginally beneficial	17	25.4	25.4	43.3
	beneficial-very beneficial	38	56.7	56.7	100.0
	Total	67	100.0	100.0	

H.5.6. E-Business benefit of improved information sharing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not beneficial	9	13.4	13.4	13.4
	marginally beneficial	14	20.9	20.9	34.3
	beneficial-very beneficial	44	65.7	65.7	100.0
	Total	67	100.0	100.0	

H.5.7. E-Business benefit of improved supply chain management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not beneficial	12	17.9	17.9	17.9
	marginally beneficial	23	34.3	34.3	52.2
	beneficial-very beneficial	32	47.8	47.8	100.0
	Total	67	100.0	100.0	

H.5.8. E-Business benefit of expanded market share

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not beneficial	16	23.9	23.9	23.9
	marginally beneficial	19	28.4	28.4	52.2
	beneficial-very beneficial	32	47.8	47.8	100.0
	Total	67	100.0	100.0	

H.5.9. E-Business benefit of improved planning

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not beneficial	18	26.9	26.9	26.9
	marginally beneficial	19	28.4	28.4	55.2
	beneficial-very beneficial	30	44.8	44.8	100.0
	Total	67	100.0	100.0	

H.5.10. E-Business benefit of improved product flow management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not beneficial	13	19.4	19.4	19.4
	marginally beneficial	22	32.8	32.8	52.2
	beneficial-very beneficial	32	47.8	47.8	100.0
	Total	67	100.0	100.0	

H.5.11. E-Business benefit of improved forecasting and planning

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not beneficial	15	22.4	22.7	22.7
	marginally beneficial	19	28.4	28.8	51.5
	beneficial-very beneficial	32	47.8	48.5	100.0
	Total	66	98.5	100.0	
Missing	System	1	1.5		
Total		67	100.0		

Appendix I.5. Bivariate analysis of benefits of E-Business after recoding

Table I.5.1. E-Business benefit of improved customer service * Success of the company in implementation of the E-Business Cross tabulation

			Success of the company in implementation of the E-Business			Total
			very successful-successful	partially successful	failure	
E-Business benefit of improved customer service	not relevant-not beneficial	Count	4	2	0	6
		% within E-Business benefit of improved customer service	66.7%	33.3%	0.0%	100.0%
	marginally beneficial	Count	4	7	0	11
		% within E-Business benefit of improved customer service	36.4%	63.6%	0.0%	100.0%
	beneficial-very beneficial	Count	27	22	1	50
		% within E-Business benefit of improved customer service	54.0%	44.0%	2.0%	100.0%
Total		Count	35	31	1	67
		% within E-Business benefit of improved customer service	52.2%	46.3%	1.5%	100.0%

Table I.5.2. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.129[a]	4	.712
Likelihood Ratio	2.367	4	.669
Linear-by-Linear Association	.014	1	.906
N of Valid Cases	67		

a. 5 cells (55.6%) have expected count less than 5. The minimum expected count is .09.

Table I.5.3. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.178	.712
	Cramer's V	.126	.712
N of Valid Cases		67	

Table I.5.4. E-Business benefit of enhanced customer satisfaction * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business			Total
			very successful-successful	partially successful	failure	
E-Business benefit of enhanced customer satisfaction	not relevant-not beneficial	Count	3	2	0	5
		% within E-Business benefit of enhanced customer satisfaction	60.0%	40.0%	0.0%	100.0%
	marginally beneficial	Count	8	9	0	17
		% within E-Business benefit of enhanced customer satisfaction	47.1%	52.9%	0.0%	100.0%
	beneficial-very beneficial	Count	24	20	1	45
		% within E-Business benefit of enhanced customer satisfaction	53.3%	44.4%	2.2%	100.0%
Total		Count	35	31	1	67
		% within E-Business benefit of enhanced customer satisfaction	52.2%	46.3%	1.5%	100.0%

Table I.5.5. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.129[a]	4	.712
Likelihood Ratio	2.367	4	.669
Linear-by-Linear Association	.014	1	.906
N of Valid Cases	67		

a. 5 cells (55.6%) have expected count less than 5. The minimum expected count is .09.

Table I.5.6. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.178	.712
	Cramer's V	.126	.712
N of Valid Cases		67	

Table I.5.7. E-Business benefit of enhanced competitive advantage * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business			Total
			very successful-successful	partially successful	failure	
E-Business benefit of enhanced competitive advantage	not relevant-not beneficial	Count	3	9	0	12
		% within E-Business benefit of enhanced competitive advantage	25.0%	75.0%	0.0%	100.0%
	marginally beneficial	Count	9	9	0	18
		% within E-Business benefit of enhanced competitive advantage	50.0%	50.0%	0.0%	100.0%
	beneficial-very beneficial	Count	23	13	1	37
		% within E-Business benefit of enhanced competitive advantage	62.2%	35.1%	2.7%	100.0%
Total		Count	35	31	1	67
		% within E-Business benefit of enhanced competitive advantage	52.2%	46.3%	1.5%	100.0%

Table I.5.8. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.416[a]	4	.170
Likelihood Ratio	6.911	4	.141
Linear-by-Linear Association	3.537	1	.060
N of Valid Cases	67		

a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is .18.

Table I.5.9. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.309	.170
	Cramer's V	.219	.170
N of Valid Cases		67	

Table I.5.10. E-Business benefit of creating interactive relationships with suppliers * Success of the company in implementation of the E-Business

			Success of the company in implementation of the E-Business			
			successful-vary successful	partially successful	failure	Total
E-Business benefit of creating interactive relationships with suppliers	not relevant-not beneficial	Count	7	13	0	20
		% within E-Business benefit of enhanced competitive advantage	35.0%	65.0%	.0%	100.0%
	marginally beneficial	Count	15	9	0	24
		% within E-Business benefit of enhanced competitive advantage	62.5%	37.5%	.0%	100.0%
	beneficial-very beneficial	Count	13	9	1	23
		% within E-Business benefit of enhanced competitive advantage	56.5%	39.1%	4.3%	100.0%
Total		Count	35	31	1	
		% within E-Business benefit of enhanced competitive advantage	52.2%	46.3%	1.5%	

Table I.5.11. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.784[a]	4	.216
Likelihood Ratio	6.000	4	.199
Linear-by-Linear Association	.993	1	.319
N of Valid Cases	67		

a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is .30.

Table I.5.12. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.294	.216
	Cramer's V	.208	.216
N of Valid Cases		67	

Table I.5.13. E-Business benefit of creating interactive relationships with customers * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business			Total
			very successful-successful	partially successful	failure	
E-Business benefit of creating interactive relationships with customers	not relevant-not beneficial	Count	4	8	0	12
		% within E-Business benefit of creating interactive relationships with customers	33.3%	66.7%	0.0%	100.0%
	marginally beneficial	Count	8	9	0	17
		% within E-Business benefit of creating interactive relationships with customers	47.1%	52.9%	0.0%	100.0%
	beneficial-very beneficial	Count	23	14	1	38
		% within E-Business benefit of creating interactive relationships with customers	60.5%	36.8%	2.6%	100.0%
Total		Count	35	31	1	67
		% within E-Business benefit of creating interactive relationships with customers	52.2%	46.3%	1.5%	100.0%

Table I.5.14. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.144[a]	4	.387
Likelihood Ratio	4.533	4	.339
Linear-by-Linear Association	2.038	1	.153
N of Valid Cases	67		

a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is .18.

Table I.5.15. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.249	.387
	Cramer's V	.176	.387
N of Valid Cases		67	

Table I.5.16. E-Business benefit of improved information sharing * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business			Total
			very successful-successful	partially successful	failure	
E-Business benefit of improved information sharing	not relevant-not beneficial	Count	2	7	0	9
		% within E-Business benefit of improved information sharing	22.2%	77.8%	0.0%	100.0%
	marginally beneficial	Count	4	10	0	14
		% within E-Business benefit of improved information sharing	28.6%	71.4%	0.0%	100.0%
	beneficial-very beneficial	Count	29	14	1	44
		% within E-Business benefit of improved information sharing	65.9%	31.8%	2.3%	100.0%
Total		Count	35	31	1	67
		% within E-Business benefit of improved information sharing	52.2%	46.3%	1.5%	100.0%

Table I.5.17. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.983[a]	4	.027
Likelihood Ratio	11.549	4	.021
Linear-by-Linear Association	6.884	1	.009
N of Valid Cases	67		

a. 5 cells (55.6%) have expected count less than 5. The minimum expected count is .13.

Table I.5.18. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.405	.027
	Cramer's V	.286	.027
N of Valid Cases		67	

Table I.5.19. E-Business benefit of improved supply chain management * Success of the company in implementation of the E-Business Cross tabulation

			Success of the company in implementation of the E-Business			Total
			very successful-successful	partially successful	failure	
E-Business benefit of improved supply chain management	not relevant-not beneficial	Count	4	8	0	12
		% within E-Business benefit of improved supply chain management	33.3%	66.7%	0.0%	100.0%
	marginally beneficial	Count	8	14	1	23
		% within E-Business benefit of improved supply chain management	34.8%	60.9%	4.3%	100.0%
	beneficial-very beneficial	Count	23	9	0	32
		% within E-Business benefit of improved supply chain management	71.9%	28.1%	0.0%	100.0%
Total		Count	35	31	1	67
		% within E-Business benefit of improved supply chain management	52.2%	46.3%	1.5%	100.0%

Table I.5.20. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.853[a]	4	.028
Likelihood Ratio	11.279	4	.024
Linear-by-Linear Association	7.252	1	.007
N of Valid Cases	67		

a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is .18.

Table I.5.21. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.402	.028
	Cramer's V	.285	.028
N of Valid Cases		67	

Table I.5.22. E-Business benefit of expanded market share * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business			Total
			very successful-successful	partially successful	failure	
E-Business benefit of expanded market share	not relevant-not beneficial	Count	6	10	0	16
		% within E-Business benefit of expanded market share	37.5%	62.5%	0.0%	100.0%
	marginally beneficial	Count	12	7	0	19
		% within E-Business benefit of expanded market share	63.2%	36.8%	0.0%	100.0%
	beneficial-very beneficial	Count	17	14	1	32
		% within E-Business benefit of expanded market share	53.1%	43.8%	3.1%	100.0%
Total		Count	35	31	1	67
		% within E-Business benefit of expanded market share	52.2%	46.3%	1.5%	100.0%

Table I.5.23. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.517[a]	4	.475
Likelihood Ratio	3.885	4	.422
Linear-by-Linear Association	.282	1	.595
N of Valid Cases	67		

a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is .24.

Table I.5.24. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.229	.475
	Cramer's V	.162	.475
N of Valid Cases		67	

Table I.5.25. E-Business benefit of improved planning * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business			Total
			very successful-successful	partially successful	failure	
E-Business benefit of improved planning	not relevant-not beneficial	Count	6	12	0	18
		% within E-Business benefit of improved planning	33.3%	66.7%	0.0%	100.0%
	marginally beneficial	Count	9	10	0	19
		% within E-Business benefit of improved planning	47.4%	52.6%	0.0%	100.0%
	beneficial-very beneficial	Count	20	9	1	30
		% within E-Business benefit of improved planning	66.7%	30.0%	3.3%	100.0%
Total		Count	35	31	1	67
		% within E-Business benefit of improved planning	52.2%	46.3%	1.5%	100.0%

Table I.5.26. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.248[a]	4	.123
Likelihood Ratio	7.753	4	.101
Linear-by-Linear Association	3.667	1	.056
N of Valid Cases	67		

a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is .27.

Table I.5.27. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.329	.123
	Cramer's V	.233	.123
N of Valid Cases		67	

Table I.5.28. E-Business benefit of improved product flow management * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business			Total
			very successful-successful	partially successful	failure	
E-Business benefit of improved product flow management	not relevant-not beneficial	Count	4	9	0	13
		% within E-Business benefit of improved product flow management	30.8%	69.2%	0.0%	100.0%
	marginally beneficial	Count	10	12	0	22
		% within E-Business benefit of improved product flow management	45.5%	54.5%	0.0%	100.0%
	beneficial-very beneficial	Count	21	10	1	32
		% within E-Business benefit of improved product flow management	65.6%	31.2%	3.1%	100.0%
Total		Count	35	31	1	67
		% within E-Business benefit of improved product flow management	52.2%	46.3%	1.5%	100.0%

Table I.5.29. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.900[a]	4	.141
Likelihood Ratio	7.397	4	.116
Linear-by-Linear Association	3.593	1	.058
N of Valid Cases	67		

a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is .19.

Table I.5.30. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.321	.141
	Cramer's V	.227	.141
N of Valid Cases		67	

Table I.5.31. E-Business benefit of improved forecasting and planning * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business			Total
			very successful-successful	partially successful	failure	
E-Business benefit of improved forecasting and planning	not relevant-not beneficial	Count	6	9	0	15
		% within E-Business benefit of improved forecasting and planning	40.0%	60.0%	0.0%	100.0%
	marginally beneficial	Count	9	10	0	19
		% within E-Business benefit of improved forecasting and planning	47.4%	52.6%	0.0%	100.0%
	beneficial-very beneficial	Count	19	12	1	32
		% within E-Business benefit of improved forecasting and planning	59.4%	37.5%	3.1%	100.0%
Total		Count	34	31	1	66
		% within E-Business benefit of improved forecasting and planning	51.5%	47.0%	1.5%	100.0%

Table I.5.32. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.179[a]	4	.528
Likelihood Ratio	3.577	4	.466
Linear-by-Linear Association	1.010	1	.315
N of Valid Cases	66		

a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is .23.

Table I.5.33. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.219	.528
	Cramer's V	.155	.528
N of Valid Cases		66	

Appendix J.5. Univariate analysis of benefits of E-Business after second recoding

Table J.5.1. E-Business benefit of improved customer service

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not beneficial-marginally beneficial	17	25.4	25.4	25.4
	beneficial-very beneficial	50	74.6	74.6	100.0
	Total	67	100.0	100.0	

Table J.5.2. E-Business benefit of enhanced customer satisfaction

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not beneficial-marginally beneficial	22	32.8	32.8	32.8
	beneficial-very beneficial	45	67.2	67.2	100.0
	Total	67	100.0	100.0	

Table J.5.3. E-Business benefit of enhanced competitive advantage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not beneficial-marginally beneficial	30	44.8	44.8	44.8
	beneficial-very beneficial	37	55.2	55.2	100.0
	Total	67	100.0	100.0	

Table J.5.4. E-Business benefit of creating interactive relationships with suppliers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not beneficial-marginally beneficial	44	65.7	65.7	65.7
	beneficial-very beneficial	23	34.3	34.3	100.0
	Total	67	100.0	100.0	

Table J.5.5. E-Business benefit of creating interactive relationships with customers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not beneficial-marginally beneficial	29	43.3	43.3	43.3
	beneficial-very beneficial	38	56.7	56.7	100.0
	Total	67	100.0	100.0	

Table J.5.6. E-Business benefit of improved information sharing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not beneficial-marginally beneficial	23	34.3	34.3	34.3
	beneficial-very beneficial	44	65.7	65.7	100.0
	Total	67	100.0	100.0	

Table J.5.7. E-Business benefit of improved supply chain management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not beneficial-marginally beneficial	35	52.2	52.2	52.2
	beneficial-very beneficial	32	47.8	47.8	100.0
	Total	67	100.0	100.0	

Table J.5.8. E-Business benefit of expanded market share

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not beneficial-marginally beneficial	35	52.2	52.2	52.2
	beneficial-very beneficial	32	47.8	47.8	100.0
	Total	67	100.0	100.0	

Table J.5.9. E-Business benefit of improved planning

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not beneficial-marginally beneficial	37	55.2	55.2	55.2
	beneficial-very beneficial	30	44.8	44.8	100.0
	Total	67	100.0	100.0	

Table J.5.10. E-Business benefit of improved product flow management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not beneficial-marginally beneficial	35	52.2	52.2	52.2
	beneficial-very beneficial	32	47.8	47.8	100.0
	Total	67	100.0	100.0	

Table J.5.11. E-Business benefit of improved forecasting and planning

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not beneficial-marginally beneficial	34	50.7	51.5	51.5
	beneficial-very beneficial	32	47.8	48.5	100.0
	Total	66	98.5	100.0	
Missing	System	1	1.5		
Total		67	100.0		

Appendix K.5. Bivariate analysis of benefits of E-Business after second recoding

Table K.5.1. E-Business benefit of improved customer service * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		
			very successful-successful	partially successful-failure	Total
E-Business benefit of improved customer service	not relevant-not beneficial-marginally beneficial	Count	8	9	17
		% within E-Business benefit of improved customer service	47.1%	52.9%	100.0%
	beneficial-very beneficial	Count	27	23	50
		% within E-Business benefit of improved customer service	54.0%	46.0%	100.0%
Total		Count	35	32	67
		% within E-Business benefit of improved customer service	52.2%	47.8%	100.0%

Table K.5.2. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.245[a]	1	.621		
Continuity Correction[b]	.046	1	.831		
Likelihood Ratio	.245	1	.621		
Fisher's Exact Test				.780	.415
Linear-by-Linear Association	.241	1	.623		
N of Valid Cases	67				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.12.

Table K.5.3. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.060	.621
	Cramer's V	.060	.621
N of Valid Cases		67	

Table K.5.4. E-Business benefit of enhanced customer satisfaction * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		
			very successful-successful	partially successful-failure	Total
E-Business benefit of enhanced customer satisfaction	not relevant-not beneficial-marginally beneficial	Count	11	11	22
		% within E-Business benefit of enhanced customer satisfaction	50.0%	50.0%	100.0%
	beneficial-very beneficial	Count	24	21	45
		% within E-Business benefit of enhanced customer satisfaction	53.3%	46.7%	100.0%
Total		Count	35	32	67
		% within E-Business benefit of enhanced customer satisfaction	52.2%	47.8%	100.0%

Table K.5.5. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.066[a]	1	.798		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.066	1	.798		
Fisher's Exact Test				1.000	.501
Linear-by-Linear Association	.065	1	.799		
N of Valid Cases	67				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.51.

b. Computed only for a 2x2 Table

Table K.5.6. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.031	.798
	Cramer's V	.031	.798
N of Valid Cases		67	

Table K.5.7. E-Business benefit of enhanced competitive advantage * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		
			very successful-successful	partially successful-failure	Total
E-Business benefit of enhanced competitive advantage	not relevant-not beneficial-marginally beneficial	Count	12	18	30
		% within E-Business benefit of enhanced competitive advantage	40.0%	60.0%	100.0%
	beneficial-very beneficial	Count	23	14	37
		% within E-Business benefit of enhanced competitive advantage	62.2%	37.8%	100.0%
Total		Count	35	32	67
		% within E-Business benefit of enhanced competitive advantage	52.2%	47.8%	100.0%

Table K.5.8. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.261[a]	1	.071		
Continuity Correction[b]	2.434	1	.119		
Likelihood Ratio	3.285	1	.070		
Fisher's Exact Test				.088	.059
Linear-by-Linear Association	3.213	1	.073		
N of Valid Cases	67				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 14.33.

b. Computed only for a 2x2 Table

Table K.5.9. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.221	.071
	Cramer's V	.221	.071
N of Valid Cases		67	

Table K.5.10. E-Business benefit of creating interactive relationships with suppliers * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		
			very successful-successful	partially successful-failure	Total
E-Business benefit of creating interactive relationships with suppliers	not relevant-not beneficial-marginally beneficial	Count	22	22	44
		% within E-Business benefit of creating interactive relationships with customers	50.0%	50.0%	100.0%
	beneficial-very beneficial	Count	13	10	23
		% within E-Business benefit of creating interactive relationships with customers	56.5%	43.5%	100.0%
Total		Count	35	32	67
		% within E-Business benefit of creating interactive relationships with customers	52.2%	47.8%	100.0%

Table K.5.11. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.257[a]	1	.612		
Continuity Correction[b]	.062	1	.803		
Likelihood Ratio	.258	1	.611		
Fisher's Exact Test				.797	.402
Linear-by-Linear Association	.254	1	.615		
N of Valid Cases	67				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.99.

b. Computed only for a 2x2 Table

Table K.5.12. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.062	.612
	Cramer's V	.062	.612
N of Valid Cases		67	

Table K.5.13. E-Business benefit of creating interactive relationships with customers * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		
			very successful-successful	partially successful-failure	Total
E-Business benefit of creating interactive relationships with customers	not relevant-not beneficial-marginally beneficial	Count	12	17	29
		% within E-Business benefit of creating interactive relationships with customers	41.4%	58.6%	100.0%
	beneficial-very beneficial	Count	23	15	38
		% within E-Business benefit of creating interactive relationships with customers	60.5%	39.5%	100.0%
Total		Count	35	32	67
		% within E-Business benefit of creating interactive relationships with customers	52.2%	47.8%	100.0%

Table K.5.14. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.417[a]	1	.120		
Continuity Correction[b]	1.710	1	.191		
Likelihood Ratio	2.429	1	.119		
Fisher's Exact Test				.144	.095
Linear-by-Linear Association	2.381	1	.123		
N of Valid Cases	67				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 13.85.

b. Computed only for a 2x2 Table

Table K.5.15. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.190	.120
	Cramer's V	.190	.120
N of Valid Cases		67	

Table K.5.16. E-Business benefit of improved information sharing * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		
			very successful-successful	partially successful-failure	Total
E-Business benefit of improved information sharing	not relevant-not beneficial-marginally beneficial	Count	6	17	23
		% within E-Business benefit of improved information sharing	26.1%	73.9%	100.0%
	beneficial-very beneficial	Count	29	15	44
		% within E-Business benefit of improved information sharing	65.9%	34.1%	100.0%
Total		Count	35	32	67
		% within E-Business benefit of improved information sharing	52.2%	47.8%	100.0%

Table K.5.17. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	9.600[a]	1	.002		
Continuity Correction[b]	8.071	1	.004		
Likelihood Ratio	9.881	1	.002		
Fisher's Exact Test				.004	.002
Linear-by-Linear Association	9.457	1	.002		
N of Valid Cases	67				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.99.

b. Computed only for a 2x2 Table

Table K.5.18. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.379	.002
	Cramer's V	.379	.002
N of Valid Cases		67	

Table K.5.19. E-Business benefit of improved supply chain management * Success of the company in implementation of the E-Business Cross tabulation

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
E-Business benefit of improved supply chain management	not relevant-not beneficial-marginally beneficial	Count	12	23	35
		% within E-Business benefit of improved supply chain management	34.3%	65.7%	100.0%
	beneficial-very beneficial	Count	23	9	32
		% within E-Business benefit of improved supply chain management	71.9%	28.1%	100.0%
Total		Count	35	32	67
		% within E-Business benefit of improved supply chain management	52.2%	47.8%	100.0%

Table K.5.20. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	9.467[a]	1	.002		
Continuity Correction[b]	8.020	1	.005		
Likelihood Ratio	9.719	1	.002		
Fisher's Exact Test				.003	.002
Linear-by-Linear Association	9.325	1	.002		
N of Valid Cases	67				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.28.

b. Computed only for a 2x2 Table

Table K.5.21. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.376	.002
	Cramer's V	.376	.002
N of Valid Cases		67	

Table K.5.22. E-Business benefit of expanded market share * Success of the company in implementation of the E-Business Cross tabulation

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
E-Business benefit of expanded market share	not relevant-not beneficial-marginally beneficial	Count	18	17	35
		% within E-Business benefit of expanded market share	51.4%	48.6%	100.0%
	beneficial-very beneficial	Count	17	15	32
		% within E-Business benefit of expanded market share	53.1%	46.9%	100.0%
Total		Count	35	32	67
		% within E-Business benefit of expanded market share	52.2%	47.8%	100.0%

Table K.5.23. Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.019[a]	1	.890		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.019	1	.890		
Fisher's Exact Test				1.000	.542
Linear-by-Linear Association	.019	1	.890		
N of Valid Cases	67				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.28.

b. Computed only for a 2x2 Table

Table K.5.24. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.017	.890
	Cramer's V	.017	.890
N of Valid Cases		67	

Table K.5.25. E-Business benefit of improved planning * Success of the company in implementation of the E-Business Cross tabulation

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
E-Business benefit of improved planning	not relevant-not beneficial-marginally beneficial	Count	15	22	37
		% within E-Business benefit of improved planning	40.5%	59.5%	100.0%
	beneficial-very beneficial	Count	20	10	30
		% within E-Business benefit of improved planning	66.7%	33.3%	100.0%
Total		Count	35	32	67
		% within E-Business benefit of improved planning	52.2%	47.8%	100.0%

Table K.5.26. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.532[a]	1	.033		
Continuity Correction[b]	3.546	1	.060		
Likelihood Ratio	4.596	1	.032		
Fisher's Exact Test				.049	.029
Linear-by-Linear Association	4.465	1	.035		
N of Valid Cases	67				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 14.33.

b. Computed only for a 2x2 Table

Table K.5.27. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.260	.033
	Cramer's V	.260	.033
N of Valid Cases		67	

Table K.5.28. E-Business benefit of improved product flow management * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
E-Business benefit of improved product flow management	not relevant-not beneficial-marginally beneficial	Count	14	21	35
		% within E-Business benefit of improved product flow management	40.0%	60.0%	100.0%
	beneficial-very beneficial	Count	21	11	32
		% within E-Business benefit of improved product flow management	65.6%	34.4%	100.0%
Total		Count	35	32	67
		% within E-Business benefit of improved product flow management	52.2%	47.8%	100.0%

Table K.5.29. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.399[a]	1	.036		
Continuity Correction[b]	3.432	1	.064		
Likelihood Ratio	4.453	1	.035		
Fisher's Exact Test				.051	.032
Linear-by-Linear Association	4.334	1	.037		
N of Valid Cases	67				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.28.

b. Computed only for a 2x2 Table

Table K.5.30. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.256	.036
	Cramer's V	.256	.036
N of Valid Cases		67	

Table K.5.31. E-Business benefit of improved forecasting and planning * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
E-Business benefit of improved forecasting and planning	not relevant-not beneficial-marginally beneficial	Count	15	19	34
		% within E-Business benefit of improved forecasting and planning	44.1%	55.9%	100.0%
	beneficial-very beneficial	Count	19	13	32
		% within E-Business benefit of improved forecasting and planning	59.4%	40.6%	100.0%
Total		Count	34	32	66
		% within E-Business benefit of improved forecasting and planning	51.5%	48.5%	100.0%

Table K.5.32. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.536[a]	1	.215		
Continuity Correction[b]	.986	1	.321		
Likelihood Ratio	1.543	1	.214		
Fisher's Exact Test				.231	.160
Linear-by-Linear Association	1.513	1	.219		
N of Valid Cases	66				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.52.

b. Computed only for a 2x2 Table

Table K.5.33. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.153	.215
	Cramer's V	.153	.215
N of Valid Cases		66	

Appendix L.5. Univariate analysis of the impact of environmental factors on E-Business adoption

Table L.5.1. Impact of the environmental variable of competitive pressure on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	11	16.4	16.4	16.4
	not significant	7	10.4	10.4	26.9
	marginally significant	16	23.9	23.9	50.7
	significant	21	31.3	31.3	82.1
	very significant	12	17.9	17.9	100.0
	Total	67	100.0	100.0	

Table L.5.2. Impact of the environmental variable of business partners pressure on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	21	31.3	31.3	31.3
	not significant	10	14.9	14.9	46.3
	marginally significant	22	32.8	32.8	79.1
	significant	10	14.9	14.9	94.0
	very significant	4	6.0	6.0	100.0
	Total	67	100.0	100.0	

Table L.5.3. Impact of the environmental variable of customer requirements on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	5	7.5	7.5	7.5
	not significant	1	1.5	1.5	9.0
	marginally significant	13	19.4	19.4	28.4
	significant	31	46.3	46.3	74.6
	very significant	17	25.4	25.4	100.0
	Total	67	100.0	100.0	

Table L.5.4. Impact of the environmental variable of IS vendor support on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	20	29.9	30.3	30.3
	not significant	8	11.9	12.1	42.4
	marginally significant	26	38.8	39.4	81.8
	significant	11	16.4	16.7	98.5
	very significant	1	1.5	1.5	100.0
	Total	66	98.5	100.0	
Missing	System	1	1.5		
Total		67	100.0		

Table L.5.5. Impact of the environmental variable of financial resource availability on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	16	23.9	23.9	23.9
	not significant	8	11.9	11.9	35.8
	marginally significant	21	31.3	31.3	67.2
	significant	15	22.4	22.4	89.6
	very significant	7	10.4	10.4	100.0
	Total	67	100.0	100.0	

Table L.5.6. Impact of the environmental variable of industry on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	16	23.9	23.9	23.9
	not significant	8	11.9	11.9	35.8
	marginally significant	20	29.9	29.9	65.7
	significant	12	17.9	17.9	83.6
	very significant	11	16.4	16.4	100.0
	Total	67	100.0	100.0	

Table L.5.7. Impact of the environmental variable of government on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	27	40.3	40.9	40.9
	not significant	12	17.9	18.2	59.1
	marginally significant	17	25.4	25.8	84.8
	significant	7	10.4	10.6	95.5
	very significant	3	4.5	4.5	100.0
	Total	66	98.5	100.0	
Missing	System	1	1.5		
Total		67	100.0		

Appendix M.5. Univariate analysis of the impact of various environmental factors on E-Business adoption after recoding

Table. M.5.1. Impact of the environmental variable of customer requirements on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant	6	9.0	9.0	9.0
	marginally significant	13	19.4	19.4	28.4
	significant-very significant	48	71.6	71.6	100.0
	Total	67	100.0	100.0	

Table. M.5.2. Impact of the environmental variable of competitive pressure on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant	18	26.9	26.9	26.9
	marginally significant	16	23.9	23.9	50.7
	significant-very significant	33	49.3	49.3	100.0
	Total	67	100.0	100.0	

Table. M.5.3. Impact of the environmental variable of industry on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant	24	35.8	35.8	35.8
	marginally significant	20	29.9	29.9	65.7
	significant-very significant	23	34.3	34.3	100.0
	Total	67	100.0	100.0	

Table. M.5.4. Impact of the environmental variable of financial resource availability on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant	24	35.8	35.8	35.8
	marginally significant	21	31.3	31.3	67.2
	significant-very significant	22	32.8	32.8	100.0
	Total	67	100.0	100.0	

Table. M.5.5. Impact of the environmental variable of business partners pressure on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant	31	46.3	46.3	46.3
	marginally significant	22	32.8	32.8	79.1
	significant-very significant	14	20.9	20.9	100.0
	Total	67	100.0	100.0	

Table. M.5.6. Impact of the environmental variable of IS vendor support on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant	28	41.8	42.4	42.4
	marginally significant	26	38.8	39.4	81.8
	significant-very significant	12	17.9	18.2	100.0
	Total	66	98.5	100.0	
Missing	System	1	1.5		
Total		67	100.0		

Table. M.5.7. Impact of the environmental variable of government on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant	39	58.2	59.1	59.1
	marginally significant	17	25.4	25.8	84.8
	significant-very significant	10	14.9	15.2	100.0
	Total	66	98.5	100.0	
Missing	System	1	1.5		
Total		67	100.0		

Appendix N.5. Univariate analysis of the impact of various environmental factors on E-Business adoption after recoding

Table N.5.1. Impact of the environmental variable of customer requirements on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
Impact of the environmental variable of customer requirements on E-Business adoption	not relevant-not significant	Count	1	5	6
		% within Impact of the environmental variable of customer requirements on E-Business adoption	16.7%	83.3%	100.0%
	marginally significant	Count	6	7	13
		% within Impact of the environmental variable of customer requirements on E-Business adoption	46.2%	53.8%	100.0%
	significant-very significant	Count	28	20	48
		% within Impact of the environmental variable of customer requirements on E-Business adoption	58.3%	41.7%	100.0%
Total		Count	35	32	67
		% within Impact of the environmental variable of customer requirements on E-Business adoption	52.2%	47.8%	100.0%

Table N.5.2. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.951[a]	2	.139
Likelihood Ratio	4.193	2	.123
Linear-by-Linear Association	3.653	1	.056
N of Valid Cases	67		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 2.87.

Table N.5.3. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.243	.139
	Cramer's V	.243	.139
N of Valid Cases		67	

N.5.4. Impact of the environmental variable of competitive pressure on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
Impact of the environmental variable of competitive pressure on E-Business adoption	not relevant-not significant	Count	5	13	18
		% within Impact of the environmental variable of competitive pressure on E-Business adoption	27.8%	72.2%	100.0%
	marginally significant	Count	9	7	16
		% within Impact of the environmental variable of competitive pressure on E-Business adoption	56.2%	43.8%	100.0%
	significant-very significant	Count	21	12	33
		% within Impact of the environmental variable of competitive pressure on E-Business adoption	63.6%	36.4%	100.0%
Total		Count	35	32	67
		% within Impact of the environmental variable of competitive pressure on E-Business adoption	52.2%	47.8%	100.0%

Table N.5.5. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.138[a]	2	.046
Likelihood Ratio	6.285	2	.043
Linear-by-Linear Association	5.524	1	.019
N of Valid Cases	67		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.64.

Table N.5.6. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.303	.046
	Cramer's V	.303	.046
N of Valid Cases		67	

Table N.5.7. Impact of the environmental variable of industry on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
Impact of the environmental variable of industry on E-Business adoption	not relevant-not significant	Count	11	13	24
		% within Impact of the environmental variable of industry on E-Business adoption	45.8%	54.2%	100.0%
	marginally significant	Count	8	12	20
		% within Impact of the environmental variable of industry on E-Business adoption	40.0%	60.0%	100.0%
	significant-very significant	Count	16	7	23
		% within Impact of the environmental variable of industry on E-Business adoption	69.6%	30.4%	100.0%
Total		Count	35	32	67
		% within Impact of the environmental variable of industry on E-Business adoption	52.2%	47.8%	100.0%

Table N.5.8. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.363[a]	2	.113
Likelihood Ratio	4.456	2	.108
Linear-by-Linear Association	2.563	1	.109
N of Valid Cases	67		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.55.

Table N.5.9. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.255	.113
	Cramer's V	.255	.113
N of Valid Cases		67	

Table N.5.10. Impact of the environmental variable of financial resource availability on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
Impact of the environmental variable of financial resource availability on E-Business adoption	not relevant-not significant	Count	11	13	24
		% within Impact of the environmental variable of financial resource availability on E-Business adoption	45.8%	54.2%	100.0%
	marginally significant	Count	11	10	21
		% within Impact of the environmental variable of financial resource availability on E-Business adoption	52.4%	47.6%	100.0%
	significant-very significant	Count	13	9	22
		% within Impact of the environmental variable of financial resource availability on E-Business adoption	59.1%	40.9%	100.0%
Total		Count	35	32	67
		% within Impact of the environmental variable of financial resource availability on E-Business adoption	52.2%	47.8%	100.0%

Table N.5.11. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.809[a]	2	.667
Likelihood Ratio	.811	2	.666
Linear-by-Linear Association	.797	1	.372
N of Valid Cases	67		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.03.

Table N.5.12. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.110	.667
	Cramer's V	.110	.667
N of Valid Cases		67	

N.5.13. Impact of the environmental variable of business partners pressure on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
Impact of the environmental variable of business partners pressure on E-Business adoption	not relevant-not significant	Count	15	16	31
		% within Impact of the environmental variable of business partners pressure on E-Business adoption	48.4%	51.6%	100.0%
	marginally significant	Count	14	8	22
		% within Impact of the environmental variable of business partners pressure on E-Business adoption	63.6%	36.4%	100.0%
	significant-very significant	Count	6	8	14
		% within Impact of the environmental variable of business partners pressure on E-Business adoption	42.9%	57.1%	100.0%
Total		Count	35	32	67
		% within Impact of the environmental variable of business partners pressure on E-Business adoption	52.2%	47.8%	100.0%

Table N.5.14. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.824[a]	2	.402
Likelihood Ratio	1.842	2	.398
Linear-by-Linear Association	.001	1	.970
N of Valid Cases	67		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.69.

Table N.5.15. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.165	.402
	Cramer's V	.165	.402
N of Valid Cases		67	

Table N.5.16. Impact of the environmental variable of IS vendor support on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
Impact of the environmental variable of IS vendor support on E-Business adoption	not relevant-not significant	Count	12	16	28
		% within Impact of the environmental variable of IS vendor support on E-Business adoption	42.9%	57.1%	100.0%
	marginally significant	Count	16	10	26
		% within Impact of the environmental variable of IS vendor support on E-Business adoption	61.5%	38.5%	100.0%
	significant-very significant	Count	7	5	12
		% within Impact of the environmental variable of IS vendor support on E-Business adoption	58.3%	41.7%	100.0%
Total		Count	35	31	66
		% within Impact of the environmental variable of IS vendor support on E-Business adoption	53.0%	47.0%	100.0%

Table N.5.17. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.054[a]	2	.358
Likelihood Ratio	2.063	2	.356
Linear-by-Linear Association	1.329	1	.249
N of Valid Cases	66		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.64.

Table N.5.18. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.176	.358
	Cramer's V	.176	.358
N of Valid Cases		66	

Table N.5.19. Impact of the environmental variable of government on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
Impact of the environmental variable of government on E-Business adoption	not relevant-not significant	Count	20	19	39
		% within Impact of the environmental variable of government on E-Business adoption	51.3%	48.7%	100.0%
	marginally significant	Count	7	10	17
		% within Impact of the environmental variable of government on E-Business adoption	41.2%	58.8%	100.0%
	significant-very significant	Count	7	3	10
		% within Impact of the environmental variable of government on E-Business adoption	70.0%	30.0%	100.0%
Total		Count	34	32	66
		% within Impact of the environmental variable of government on E-Business adoption	51.5%	48.5%	100.0%

Table N.5.20. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.096[a]	2	.351
Likelihood Ratio	2.143	2	.343
Linear-by-Linear Association	.409	1	.522
N of Valid Cases	66		

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 4.85.

Table N.5.21. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.178	.351
	Cramer's V	.178	.351
N of Valid Cases		66	

Appendix O.5. Univariate analysis of the impact of various environmental factors on E-Business adoption after second recoding

Table O.5.1. Impact of the environmental variable of customer requirements on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant-marginally significant	19	28.4	28.4	28.4
	significant-very significant	48	71.6	71.6	100.0
	Total	67	100.0	100.0	

Table O.5.2. Impact of the environmental variable of competitive pressure on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant-marginally significant	34	50.7	50.7	50.7
	significant-very significant	33	49.3	49.3	100.0
	Total	67	100.0	100.0	

Table O.5.3. Impact of the environmental variable of industry on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant-marginally significant	44	65.7	65.7	65.7
	significant-very significant	23	34.3	34.3	100.0
	Total	67	100.0	100.0	

Table O.5.4. Impact of the environmental variable of financial resource availability on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant-marginally significant	45	67.2	67.2	67.2
	significant-very significant	22	32.8	32.8	100.0
	Total	67	100.0	100.0	

Table O.5.5. Impact of the environmental variable of business partners pressure on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant-marginally significant	53	79.1	79.1	79.1
	significant-very significant	14	20.9	20.9	100.0
	Total	67	100.0	100.0	

Table O.5.6. Impact of the environmental variable of IS vendor support on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant-marginally significant	54	80.6	81.8	81.8
	significant-very significant	12	17.9	18.2	100.0
	Total	66	98.5	100.0	
Missing	System	1	1.5		
Total		67	100.0		

Table O.5.7. Impact of the environmental variable of government on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant-marginally significant	56	83.6	84.8	84.8
	significant-very significant	10	14.9	15.2	100.0
	Total	66	98.5	100.0	
Missing	System	1	1.5		
Total		67	100.0		

Appendix P.5. Bivariate analysis of the impact of various environmental factors on E-Business adoption after second recoding

Table P.5.1. Impact of the environmental variable of customer requirements on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business: very successful-successful	Success of the company in implementation of the E-Business: partially successful-failure	Total
Impact of the environmental variable of customer requirements on E-Business adoption	not relevant-not significant-marginally significant	Count	7	12	19
		% within Impact of the environmental variable of customer requirements on E-Business adoption	36.8%	63.2%	100.0%
	significant-very significant	Count	28	20	48
		% within Impact of the environmental variable of customer requirements on E-Business adoption	58.3%	41.7%	100.0%
Total		Count	35	32	67
		% within Impact of the environmental variable of customer requirements on E-Business adoption	52.2%	47.8%	100.0%

Table P.5.2. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.520[a]	1	.112		
Continuity Correction[b]	1.732	1	.188		
Likelihood Ratio	2.537	1	.111		
Fisher's Exact Test				.174	.094
Linear-by-Linear Association	2.482	1	.115		
N of Valid Cases	67				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.07.
b. Computed only for a 2x2 Table

Table P.5.3. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.194	.112
	Cramer's V	.194	.112
N of Valid Cases		67	

Table P.5.4. Impact of the environmental variable of competitive pressure on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business: very successful-successful	Success of the company in implementation of the E-Business: partially successful-failure	Total
Impact of the environmental variable of competitive pressure on E-Business adoption	not relevant-not significant-marginally significant	Count	14	20	34
		% within Impact of the environmental variable of competitive pressure on E-Business adoption	41.2%	58.8%	100.0%
	significant-very significant	Count	21	12	33
		% within Impact of the environmental variable of competitive pressure on E-Business adoption	63.6%	36.4%	100.0%
Total		Count	35	32	67
		% within Impact of the environmental variable of competitive pressure on E-Business adoption	52.2%	47.8%	100.0%

Table P.5.5. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.386[a]	1	.066		
Continuity Correction[b]	2.545	1	.111		
Likelihood Ratio	3.416	1	.065		
Fisher's Exact Test				.088	.055
Linear-by-Linear Association	3.335	1	.068		
N of Valid Cases	67				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.76.

b. Computed only for a 2x2 Table

Table P.5.6. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.225	.066
	Cramer's V	.225	.066
N of Valid Cases		67	

Table P.5.7. Impact of the environmental variable of industry on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
Impact of the environmental variable of industry on E-Business adoption	not relevant-not significant-marginally significant	Count	19	25	44
		% within Impact of the environmental variable of industry on E-Business adoption	43.2%	56.8%	100.0%
	significant-very significant	Count	16	7	23
		% within Impact of the environmental variable of industry on E-Business adoption	69.6%	30.4%	100.0%
Total		Count	35	32	67
		% within Impact of the environmental variable of industry on E-Business adoption	52.2%	47.8%	100.0%

Table P.5.8. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.214[a]	1	.040		
Continuity Correction[b]	3.223	1	.073		
Likelihood Ratio	4.304	1	.038		
Fisher's Exact Test				.070	.036
Linear-by-Linear Association	4.151	1	.042		
N of Valid Cases	67				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.99.

b. Computed only for a 2x2 Table

Table P.5.9. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.251	.040
	Cramer's V	.251	.040
N of Valid Cases		67	

Table P.5.10. Impact of the environmental variable of financial resource availability on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
Impact of the environmental variable of financial resource availability on E-Business adoption	not relevant-not significant-marginally significant	Count	22	23	45
		% within Impact of the environmental variable of financial resource availability on E-Business adoption	48.9%	51.1%	100.0%
	significant-very significant	Count	13	9	22
		% within Impact of the environmental variable of financial resource availability on E-Business adoption	59.1%	40.9%	100.0%
Total		Count	35	32	67
		% within Impact of the environmental variable of financial resource availability on E-Business adoption	52.2%	47.8%	100.0%

Table P.5.11. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.616[a]	1	.432		
Continuity Correction[b]	.275	1	.600		
Likelihood Ratio	.619	1	.431		
Fisher's Exact Test				.450	.301
Linear-by-Linear Association	.607	1	.436		
N of Valid Cases	67				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.51.
b. Computed only for a 2x2 Table

Table P.5.12. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.096	.432
	Cramer's V	.096	.432
N of Valid Cases		67	

Table P.5.13. Impact of the environmental variable of business partners pressure on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business: very successful-successful	Success of the company in implementation of the E-Business: partially successful-failure	Total
Impact of the environmental variable of business partners pressure on E-Business adoption	not relevant-not significant-marginally significant	Count	29	24	53
		% within Impact of the environmental variable of business partners pressure on E-Business adoption	54.7%	45.3%	100.0%
	significant-very significant	Count	6	8	14
		% within Impact of the environmental variable of business partners pressure on E-Business adoption	42.9%	57.1%	100.0%
Total		Count	35	32	67
		% within Impact of the environmental variable of business partners pressure on E-Business adoption	52.2%	47.8%	100.0%

Table P.5.14. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.624[a]	1	.429		
Continuity Correction[b]	.239	1	.625		
Likelihood Ratio	.625	1	.429		
Fisher's Exact Test				.551	.312
Linear-by-Linear Association	.615	1	.433		
N of Valid Cases	67				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.69.
b. Computed only for a 2x2 Table

Table P.5.15. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.097	.429
	Cramer's V	.097	.429
N of Valid Cases		67	

Table P.5.16. Impact of the environmental variable of IS vendor support on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
Impact of the environmental variable of IS vendor support on E-Business adoption	not relevant-not significant-marginally significant	Count	28	26	54
		% within Impact of the environmental variable of IS vendor support on E-Business adoption	51.9%	48.1%	100.0%
	significant-very significant	Count	7	5	12
		% within Impact of the environmental variable of IS vendor support on E-Business adoption	58.3%	41.7%	100.0%
Total		Count	35	31	66
		% within Impact of the environmental variable of IS vendor support on E-Business adoption	53.0%	47.0%	100.0%

Table P.5.17. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.166[a]	1	.684		
Continuity Correction[b]	.008	1	.931		
Likelihood Ratio	.166	1	.683		
Fisher's Exact Test				.757	.467
Linear-by-Linear Association	.163	1	.686		
N of Valid Cases	66				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.64.

b. Computed only for a 2x2 Table

Table P.5.18. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.050	.684
	Cramer's V	.050	.684
N of Valid Cases		66	

Table P.5.19. Impact of the environmental variable of government on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially seccessful-failure	
Impact of the environmental variable of government on E-Business adoption	not relevant-not significant-marginally significant	Count	27	29	56
		% within Impact of the environmental variable of government on E-Business adoption	48.2%	51.8%	100.0%
	significant-very significant	Count	7	3	10
		% within Impact of the environmental variable of government on E-Business adoption	70.0%	30.0%	100.0%
Total		Count	34	32	66
		% within Impact of the environmental variable of government on E-Business adoption	51.5%	48.5%	100.0%

Table P.5.20. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.612[a]	1	.204		
Continuity Correction[b]	.858	1	.354		
Likelihood Ratio	1.656	1	.198		
Fisher's Exact Test				.306	.178
Linear-by-Linear Association	1.588	1	.208		
N of Valid Cases	66				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.85.

b. Computed only for a 2x2 Table

Table P.5.21. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.156	.204
	Cramer's V	.156	.204
N of Valid Cases		66	

Appendix Q.5. Univariate analysis of the impact of organisational factors on E-Business adoption

Table Q.5.1. Impact of the organisational factor of management support on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	3	4.5	4.5	4.5
	not significant	6	9.0	9.0	13.4
	marginally significant	12	17.9	17.9	31.3
	significant	32	47.8	47.8	79.1
	very significant	14	20.9	20.9	100.0
	Total	67	100.0	100.0	

Table Q.5.2. Impact of the organisational factor of employees attitude on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	6	9.0	9.0	9.0
	not significant	7	10.4	10.4	19.4
	marginally significant	13	19.4	19.4	38.8
	significant	35	52.2	52.2	91.0
	very significant	6	9.0	9.0	100.0
	Total	67	100.0	100.0	

Table Q.5.3. Impact of the organisational factor of IT competence on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	3	4.5	4.5	4.5
	not significant	5	7.5	7.5	11.9
	marginally significant	16	23.9	23.9	35.8
	significant	28	41.8	41.8	77.6
	very significant	15	22.4	22.4	100.0
	Total	67	100.0	100.0	

Table Q.5.4. Impact of the organisational factor of knowledge management on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	5	7.5	7.5	7.5
	not significant	11	16.4	16.4	23.9
	marginally significant	26	38.8	38.8	62.7
	significant	16	23.9	23.9	86.6
	very significant	9	13.4	13.4	100.0
	Total	67	100.0	100.0	

Table Q.5.5. Impact of the organisational factor of Inter organisational relationship on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	12	17.9	17.9	17.9
	not significant	13	19.4	19.4	37.3
	marginally significant	15	22.4	22.4	59.7
	significant	20	29.9	29.9	89.6
	very significant	7	10.4	10.4	100.0
	Total	67	100.0	100.0	

Table Q.5.6. Impact of the organisational factor of size of the firm on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	7	10.4	10.4	10.4
	not significant	12	17.9	17.9	28.4
	marginally significant	17	25.4	25.4	53.7
	significant	21	31.3	31.3	85.1
	very significant	10	14.9	14.9	100.0
	Total	67	100.0	100.0	

Table Q.5.7. Impact of the organisational factor of age of the firm on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	11	16.4	16.4	16.4
	not significant	20	29.9	29.9	46.3
	marginally significant	18	26.9	26.9	73.1
	significant	15	22.4	22.4	95.5
	very significant	3	4.5	4.5	100.0
	Total	67	100.0	100.0	

Table Q.5.8. Impact of the organisational factor of culture on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant	3	4.5	4.6	4.6
	not significant	7	10.4	10.8	15.4
	marginally significat	23	34.3	35.4	50.8
	significant	24	35.8	36.9	87.7
	very significant	8	11.9	12.3	100.0
	Total	65	97.0	100.0	
Missing	System	2	3.0		
Total		67	100.0		

Table Q.5.9. Alignment of IT capabilities with Overall business strategy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	38	56.7	57.6	57.6
	no	28	41.8	42.4	100.0
	Total	66	98.5	100.0	
Missing	System	1	1.5		
Total		67	100.0		

Appendix R.5. Univariate analysis of impact of various organisational factors on E-Business adoption after recoding

Table R.5.1. Impact of the organisational factor of management support on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant	9	13.4	13.4	13.4
	marginally significant	12	17.9	17.9	31.3
	significant-very significant	46	68.7	68.7	100.0
	Total	67	100.0	100.0	

Table R.5.2. Impact of the organisational factor of employees attitude on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant	13	19.4	19.4	19.4
	marginally significant	13	19.4	19.4	38.8
	significant-very significant	41	61.2	61.2	100.0
	Total	67	100.0	100.0	

Table R.5.3. Impact of the organisational factor of IT competence on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant	8	11.9	11.9	11.9
	marginally significant	16	23.9	23.9	35.8
	significant-very significant	43	64.2	64.2	100.0
	Total	67	100.0	100.0	

Table R.5.4. Impact of the organisational factor of knowledge management on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant	16	23.9	23.9	23.9
	marginally significant	26	38.8	38.8	62.7
	significant-very significant	25	37.3	37.3	100.0
	Total	67	100.0	100.0	

Table R.5.5. Impact of the organisational factor of Inter organisational relationship on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant	25	37.3	37.3	37.3
	marginally significant	15	22.4	22.4	59.7
	significant-very significant	27	40.3	40.3	100.0
	Total	67	100.0	100.0	

Table R.5.6. Impact of the organisational factor of size of the firm on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant	19	28.4	28.4	28.4
	marginally significant	17	25.4	25.4	53.7
	significant-very significant	31	46.3	46.3	100.0
	Total	67	100.0	100.0	

Table R.5.7. Impact of the organisational factor of age of the firm on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant	31	46.3	46.3	46.3
	marginally significant	18	26.9	26.9	73.1
	significant-very significant	18	26.9	26.9	100.0
	Total	67	100.0	100.0	

Table R.5.8. Impact of the organisational factor of culture on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant	10	14.9	15.4	15.4
	marginally significant	23	34.3	35.4	50.8
	significant-very significant	32	47.8	49.2	100.0
	Total	65	97.0	100.0	
Missing	System	2	3.0		
Total		67	100.0		

Appendix S.5. Bivariate analysis of impact of various organisational factors on E-Business adoption after recoding

Table S.5.1. Impact of the organisational factor of management support on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business			Total
			very successful-successful	partially successful	failure	
Impact of the organisational factor of management support on E-Business adoption	not relevant-not significant	Count	3	6	0	9
		% within Impact of the organisational factor of management support on E-Business adoption	33.3%	66.7%	0.0%	100.0%
	marginally significant	Count	3	9	0	12
		% within Impact of the organisational factor of management support on E-Business adoption	25.0%	75.0%	0.0%	100.0%
	significant-very significant	Count	29	16	1	46
		% within Impact of the organisational factor of management support on E-Business adoption	63.0%	34.8%	2.2%	100.0%
Total		Count	35	31	1	67
		% within Impact of the organisational factor of management support on E-Business adoption	52.2%	46.3%	1.5%	100.0%

Table S.5.2. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.067[a]	4	.089
Likelihood Ratio	8.485	4	.075
Linear-by-Linear Association	3.945	1	.047
N of Valid Cases	67		

a. 5 cells (55.6%) have expected count less than 5. The minimum expected count is .13.

Table S.5.3. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.347	.089
	Cramer's V	.245	.089
N of Valid Cases		67	

Table S.5.4. Impact of the organisational factor of employees attitude on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business			Total
			very successful-successful	partially successful	failure	
Impact of the organisational factor of employees attitude on E-Business adoption	not relevant-not significant	Count	7	6	0	13
		% within Impact of the organisational factor of employees attitude on E-Business adoption	53.8%	46.2%	0.0%	100.0%
	marginally significant	Count	4	9	0	13
		% within Impact of the organisational factor of employees attitude on E-Business adoption	30.8%	69.2%	0.0%	100.0%
	significant-very significant	Count	24	16	1	41
		% within Impact of the organisational factor of employees attitude on E-Business adoption	58.5%	39.0%	2.4%	100.0%
Total		Count	35	31	1	67
		% within Impact of the organisational factor of employees attitude on E-Business adoption	52.2%	46.3%	1.5%	100.0%

Table S.5.5. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.045a	4	.400
Likelihood Ratio	4.411	4	.353
Linear-by-Linear Association	.267	1	.605
N of Valid Cases	67		

a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is .19.

Table S.5.6. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.246	.400
	Cramer's V	.174	.400
N of Valid Cases		67	

Table S.5.7. Impact of the organisational factor of IT competence on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business			Total
			very successful-successful	partially successful	failure	
Impact of the organisational factor of IT competence on E-Business adoption	not relevant-not significant	Count	3	5	0	8
		% within Impact of the organisational factor of IT competence on E-Business adoption	37.5%	62.5%	0.0%	100.0%
	marginally significant	Count	7	9	0	16
		% within Impact of the organisational factor of IT competence on E-Business adoption	43.8%	56.2%	0.0%	100.0%
	significant-very significant	Count	25	17	1	43
		% within Impact of the organisational factor of IT competence on E-Business adoption	58.1%	39.5%	2.3%	100.0%
Total		Count	35	31	1	67
		% within Impact of the organisational factor of IT competence on E-Business adoption	52.2%	46.3%	1.5%	100.0%

Table S.5.8. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.620[a]	4	.623
Likelihood Ratio	2.942	4	.568
Linear-by-Linear Association	1.129	1	.288
N of Valid Cases	67		

a. 5 cells (55.6%) have expected count less than 5. The minimum expected count is .12.

Table S.5.9. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.198	.623
	Cramer's V	.140	.623
N of Valid Cases		67	

Table S.5.10. Impact of the organisational factor of knowledge management on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business			Total
			very successful-successful	partially successful	failure	
Impact of the organisational factor of knowledge management on E-Business adoption	not relevant-not significant	Count	6	10	0	16
		% within Impact of the organisational factor of knowledge management on E-Business adoption	37.5%	62.5%	0.0%	100.0%
	marginally significant	Count	12	13	1	26
		% within Impact of the organisational factor of knowledge management on E-Business adoption	46.2%	50.0%	3.8%	100.0%
	significant-very significant	Count	17	8	0	25
		% within Impact of the organisational factor of knowledge management on E-Business adoption	68.0%	32.0%	0.0%	100.0%
Total		Count	35	31	1	67
		% within Impact of the organisational factor of knowledge management on E-Business adoption	52.2%	46.3%	1.5%	100.0%

Table S.5.11. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.705[a]	4	.222
Likelihood Ratio	6.039	4	.196
Linear-by-Linear Association	3.661	1	.056
N of Valid Cases	67		

a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is .24.

Table S.5.12. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.292	.222
	Cramer's V	.206	.222
N of Valid Cases		67	

Table S.5.13. Impact of the organisational factor of Inter organisational relationship on E-Business adoption * Success of the company in implementation of the E-Business

			Success of the company in implementation of the E-Business			Total
			very successful-successful	partially successful	failure	
Impact of the organisational factor of Inter organisational relationship on E-Business adoption	not relevant-not significant	Count	10	14	1	25
		% within Impact of the organisational factor of Inter organisational relationship on E-Business adoption	40.0%	56.0%	4.0%	100.0%
	marginally significant	Count	5	10	0	15
		% within Impact of the organisational factor of Inter organisational relationship on E-Business adoption	33.3%	66.7%	0.0%	100.0%
	significant-very significant	Count	20	7	0	27
		% within Impact of the organisational factor of Inter organisational relationship on E-Business adoption	74.1%	25.9%	0.0%	100.0%
Total		Count	35	31	1	67
		% within Impact of the organisational factor of Inter organisational relationship on E-Business adoption	52.2%	46.3%	1.5%	100.0%

Table S.5.14. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.163[a]	4	.038
Likelihood Ratio	10.650	4	.031
Linear-by-Linear Association	6.758	1	.009
N of Valid Cases	67		

a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is .22.

Table S.5.15. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.389	.038
	Cramer's V	.275	.038
N of Valid Cases		67	

Table S.5.16. Impact of the organisational factor of size of the firm on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business			Total
			very successful-successful	partially successful	failure	
Impact of the organisational factor of size of the firm on E-Business adoption	not relevant-not significant	Count	11	7	1	19
		% within Impact of the organisational factor of size of the firm on E-Business adoption	57.9%	36.8%	5.3%	100.0%
	marginally significant	Count	8	9	0	17
		% within Impact of the organisational factor of size of the firm on E-Business adoption	47.1%	52.9%	0.0%	100.0%
	significant-very significant	Count	16	15	0	31
		% within Impact of the organisational factor of size of the firm on E-Business adoption	51.6%	48.4%	0.0%	100.0%
Total		Count	35	31	1	67
		% within Impact of the organisational factor of size of the firm on E-Business adoption	52.2%	46.3%	1.5%	100.0%

Table S.5.17. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.291[a]	4	.510
Likelihood Ratio	3.304	4	.508
Linear-by-Linear Association	.001	1	.981
N of Valid Cases	67		

a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is .25.

Table S.5.18. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.222	.510
	Cramer's V	.157	.510
N of Valid Cases		67	

Table S.5.19. Impact of the organisational factor of age of the firm on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business			Total
			very successful-successful	partially successful	failure	
Impact of the organisational factor of age of the firm on E-Business adoption	not relevant-not significant	Count	17	13	1	31
		% within Impact of the organisational factor of age of the firm on E-Business adoption	54.8%	41.9%	3.2%	100.0%
	marginally significant	Count	7	11	0	18
		% within Impact of the organisational factor of age of the firm on E-Business adoption	38.9%	61.1%	0.0%	100.0%
	significant-very significant	Count	11	7	0	18
		% within Impact of the organisational factor of age of the firm on E-Business adoption	61.1%	38.9%	0.0%	100.0%
Total		Count	35	31	1	67
		% within Impact of the organisational factor of age of the firm on E-Business adoption	52.2%	46.3%	1.5%	100.0%

Table S.5.20. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.281[a]	4	.512
Likelihood Ratio	3.644	4	.456
Linear-by-Linear Association	.193	1	.660
N of Valid Cases	67		

a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is .27.

Table S.5.21. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.221	.512
	Cramer's V	.156	.512
N of Valid Cases		67	

Table S.5.22. Impact of the organisational factor of culture on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business			Total
			very successful-successful	partially successful	failure	
Impact of the organisational factor of culture on E-Business adoption	not relevant-not significant	Count	6	4	0	10
		% within Impact of the organisational factor of culture on E-Business adoption	60.0%	40.0%	0.0%	100.0%
	marginally significant	Count	9	13	1	23
		% within Impact of the organisational factor of culture on E-Business adoption	39.1%	56.5%	4.3%	100.0%
	significant-very significant	Count	19	13	0	32
		% within Impact of the organisational factor of culture on E-Business adoption	59.4%	40.6%	0.0%	100.0%
Total		Count	34	30	1	65
		% within Impact of the organisational factor of culture on E-Business adoption	52.3%	46.2%	1.5%	100.0%

Table S.5.23. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.838[a]	4	.428
Likelihood Ratio	4.122	4	.390
Linear-by-Linear Association	.340	1	.560
N of Valid Cases	65		

a. 4 cells (44.4%) have expected count less than 5. The minimum expected count is .15.

Table S.5.24. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.243	.428
	Cramer's V	.172	.428
N of Valid Cases		65	

Table S.5.25. Alignment of IT capabilities with Overall business strategy * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business			Total
			very successful-successful	partially successful	failure	
Alignment of IT capabilities with Overall business strategy	yes	Count	25	12	1	38
		% within Alignment of IT capabilities with Overall business strategy	65.8%	31.6%	2.6%	100.0%
	no	Count	10	18	0	28
		% within Alignment of IT capabilities with Overall business strategy	35.7%	64.3%	0.0%	100.0%
Total		Count	35	30	1	66
		% within Alignment of IT capabilities with Overall business strategy	53.0%	45.5%	1.5%	100.0%

Table S.5.26. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.281[a]	2	.026
Likelihood Ratio	7.715	2	.021
Linear-by-Linear Association	4.270	1	.039
N of Valid Cases	66		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is .42.

Table S.5.27. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.332	.026
	Cramer's V	.332	.026
N of Valid Cases		66	

Appendix T.5. Univariate analysis of impact of various organisational factors on E-Business adoption after second recoding

Table T.5.1. Impact of the organisational factor of management support on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant-marginally significant	21	31.3	31.3	31.3
	significant-very significant	46	68.7	68.7	100.0
	Total	67	100.0	100.0	

Table T.5.2. Impact of the organisational factor of employees attitude on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant-marginally significant	26	38.8	38.8	38.8
	significant-very significant	41	61.2	61.2	100.0
	Total	67	100.0	100.0	

Table T.5.3. Impact of the organisational factor of IT competence on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant-marginally significant	24	35.8	35.8	35.8
	significant-very significant	43	64.2	64.2	100.0
	Total	67	100.0	100.0	

Table T.5.4. Impact of the organisational factor of knowledge management on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant-marginally significant	42	62.7	62.7	62.7
	significant-very significant	25	37.3	37.3	100.0
	Total	67	100.0	100.0	

Table T.5.5. Impact of the organisational factor of Inter organisational relationship on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant-marginally significant	40	59.7	59.7	59.7
	significant-very significant	27	40.3	40.3	100.0
	Total	67	100.0	100.0	

Table T.5.6. Impact of the organisational factor of size of the firm on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant-marginally significant	36	53.7	53.7	53.7
	significant-very significant	31	46.3	46.3	100.0
	Total	67	100.0	100.0	

Table T.5.7. Impact of the organisational factor of age of the firm on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant-marginally significant	49	73.1	73.1	73.1
	significant-very significant	18	26.9	26.9	100.0
	Total	67	100.0	100.0	

Table T.5.8. Impact of the organisational factor of culture on E-Business adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not relevant-not significant-marginally significant	33	49.3	50.8	50.8
	significant-very significant	32	47.8	49.2	100.0
	Total	65	97.0	100.0	
Missing	System	2	3.0		
Total		67	100.0		

Appendix U.5. Bivariate analysis of impact of various organisational factors on E-Business adoption after second recoding

Table U.5.1. Impact of the organisational factor of management support on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
Impact of the organisational factor of management support on E-Business adoption	not relevant-not significant-marginally significant	Count	6	15	21
		% within Impact of the organisational factor of management support on E-Business adoption	28.6%	71.4%	100.0%
	significant-very significant	Count	29	17	46
		% within Impact of the organisational factor of management support on E-Business adoption	63.0%	37.0%	100.0%
Total		Count	35	32	67
		% within Impact of the organisational factor of management support on E-Business adoption	52.2%	47.8%	100.0%

Table U.5.2. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.867[a]	1	.009		
Continuity Correction[b]	5.555	1	.018		
Likelihood Ratio	7.017	1	.008		
Fisher's Exact Test				.017	.009
Linear-by-Linear Association	6.765	1	.009		
N of Valid Cases	67				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.03.

b. Computed only for a 2x2 Table

Table U.5.3. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.320	.009
	Cramer's V	.320	.009
N of Valid Cases		67	

Table U.5.4. Impact of the organisational factor of employees attitude on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
Impact of the organisational factor of employees attitude on E-Business adoption	not relevant-not significant-marginally significant	Count	11	15	26
		% within Impact of the organisational factor of employees attitude on E-Business adoption	42.3%	57.7%	100.0%
	significant-very significant	Count	24	17	41
		% within Impact of the organisational factor of employees attitude on E-Business adoption	58.5%	41.5%	100.0%
Total		Count	35	32	67
		% within Impact of the organisational factor of employees attitude on E-Business adoption	52.2%	47.8%	100.0%

Table U.5.5. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.680[a]	1	.195		
Continuity Correction[b]	1.092	1	.296		
Likelihood Ratio	1.684	1	.194		
Fisher's Exact Test				.219	.148
Linear-by-Linear Association	1.654	1	.198		
N of Valid Cases	67				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 12.42.

b. Computed only for a 2x2 Table

Table U.5.6. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.158	.195
	Cramer's V	.158	.195
N of Valid Cases		67	

Table U.5.7. Impact of the organisational factor of IT competence on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
Impact of the organisational factor of IT competence on E-Business adoption	not relevant-not significant-marginally significant	Count	10	14	24
		% within Impact of the organisational factor of IT competence on E-Business adoption	41.7%	58.3%	100.0%
	significant-very significant	Count	25	18	43
		% within Impact of the organisational factor of IT competence on E-Business adoption	58.1%	41.9%	100.0%
Total		Count	35	32	67
		% within Impact of the organisational factor of IT competence on E-Business adoption	52.2%	47.8%	100.0%

Table U.5.8. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.675[a]	1	.196		
Continuity Correction[b]	1.080	1	.299		
Likelihood Ratio	1.680	1	.195		
Fisher's Exact Test				.214	.149
Linear-by-Linear Association	1.650	1	.199		
N of Valid Cases	67				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.46.

b. Computed only for a 2x2 Table

Table U.5.9. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.158	.196
	Cramer's V	.158	.196
N of Valid Cases		67	

Table U.5.10. Impact of the organisational factor of knowledge management on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
Impact of the organisational factor of knowledge management on E-Business adoption	not relevant-not significant-marginally significant	Count	18	24	42
		% within Impact of the organisational factor of knowledge management on E-Business adoption	42.9%	57.1%	100.0%
	significant-very significant	Count	17	8	25
		% within Impact of the organisational factor of knowledge management on E-Business adoption	68.0%	32.0%	100.0%
Total		Count	35	32	67
		% within Impact of the organisational factor of knowledge management on E-Business adoption	52.2%	47.8%	100.0%

Table U.5.11. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.971[a]	1	.046		
Continuity Correction[b]	3.027	1	.082		
Likelihood Ratio	4.040	1	.044		
Fisher's Exact Test				.076	.040
Linear-by-Linear Association	3.912	1	.048		
N of Valid Cases	67				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.94.

b. Computed only for a 2x2 Table

Table U.5.12. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.243	.046
	Cramer's V	.243	.046
N of Valid Cases		67	

Table U.5.13. Impact of the organisational factor of Inter organisational relationship on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
Impact of the organisational factor of Inter organisational relationship on E-Business adoption	not relevant-not significant-marginally significant	Count	15	25	40
		% within Impact of the organisational factor of Inter organisational relationship on E-Business adoption	37.5%	62.5%	100.0%
	significant-very significant	Count	20	7	27
		% within Impact of the organisational factor of Inter organisational relationship on E-Business adoption	74.1%	25.9%	100.0%
Total		Count	35	32	67
		% within Impact of the organisational factor of Inter organisational relationship on E-Business adoption	52.2%	47.8%	100.0%

Table U.5.14. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.642[a]	1	.003		
Continuity Correction[b]	7.239	1	.007		
Likelihood Ratio	8.919	1	.003		
Fisher's Exact Test				.006	.003
Linear-by-Linear Association	8.513	1	.004		
N of Valid Cases	67				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 12.90.
b. Computed only for a 2x2 Table

Table U.5.15. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.359	.003
	Cramer's V	.359	.003
N of Valid Cases		67	

Table U.5.16. Impact of the organisational factor of size of the firm on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
Impact of the organisational factor of size of the firm on E-Business adoption	not relevant-not significant-marginally significant	Count	19	17	36
		% within Impact of the organisational factor of size of the firm on E-Business adoption	52.8%	47.2%	100.0%
	significant-very significant	Count	16	15	31
		% within Impact of the organisational factor of size of the firm on E-Business adoption	51.6%	48.4%	100.0%
Total		Count	35	32	67
		% within Impact of the organisational factor of size of the firm on E-Business adoption	52.2%	47.8%	100.0%

Table U.5.17. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.009[a]	1	.924		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.009	1	.924		
Fisher's Exact Test				1.000	.559
Linear-by-Linear Association	.009	1	.925		
N of Valid Cases	67				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 14.81.

b. Computed only for a 2x2 Table

Table U.5.18. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.012	.924
	Cramer's V	.012	.924
N of Valid Cases		67	

Table U.5.19. Impact of the organisational factor of age of the firm on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
Impact of the organisational factor of age of the firm on E-Business adoption	not relevant-not significant-marginally significant	Count	24	25	49
		% within Impact of the organisational factor of age of the firm on E-Business adoption	49.0%	51.0%	100.0%
	significant-very significant	Count	11	7	18
		% within Impact of the organisational factor of age of the firm on E-Business adoption	61.1%	38.9%	100.0%
Total		Count	35	32	67
		% within Impact of the organisational factor of age of the firm on E-Business adoption	52.2%	47.8%	100.0%

Table U.5.20. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.777[a]	1	.378		
Continuity Correction[b]	.366	1	.545		
Likelihood Ratio	.782	1	.376		
Fisher's Exact Test				.420	.273
Linear-by-Linear Association	.765	1	.382		
N of Valid Cases	67				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.60.

b. Computed only for a 2x2 Table

Table U.5.21. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.108	.378
	Cramer's V	.108	.378
N of Valid Cases		67	

Table U.5.22. Impact of the organisational factor of culture on E-Business adoption * Success of the company in implementation of the E-Business

Crosstab

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
Impact of the organisational factor of culture on E-Business adoption	not relevant-not significant-marginally significant	Count	15	18	33
		% within Impact of the organisational factor of culture on E-Business adoption	45.5%	54.5%	100.0%
	significant-very significant	Count	19	13	32
		% within Impact of the organisational factor of culture on E-Business adoption	59.4%	40.6%	100.0%
Total		Count	34	31	65
		% within Impact of the organisational factor of culture on E-Business adoption	52.3%	47.7%	100.0%

Table U.5.23. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.262[a]	1	.261		
Continuity Correction[b]	.766	1	.382		
Likelihood Ratio	1.266	1	.260		
Fisher's Exact Test				.324	.191
Linear-by-Linear Association	1.243	1	.265		
N of Valid Cases	65				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.26.

b. Computed only for a 2x2 Table

Table U.5.24. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.139	.261
	Cramer's V	.139	.261
N of Valid Cases		65	

Table U.5.25. Alignment of IT capabilities with Overall business strategy * Success of the company in implementation of the E-Business Crosstabulation

			Success of the company in implementation of the E-Business		Total
			very successful-successful	partially successful-failure	
Alignment of IT capabilities with Overall business strategy	Yes	Count	25	13	38
		% within Alignment of IT capabilities with Overall business strategy	65.8%	34.2%	100.0%
	No	Count	10	18	28
		% within Alignment of IT capabilities with Overall business strategy	35.7%	64.3%	100.0%
Total		Count	35	31	66
		% within Alignment of IT capabilities with Overall business strategy	53.0%	47.0%	100.0%

Table U.5.26. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.854[a]	1	.016		
Continuity Correction[b]	4.709	1	.030		
Likelihood Ratio	5.930	1	.015		
Fisher's Exact Test				.024	.015
Linear-by-Linear Association	5.766	1	.016		
N of Valid Cases	66				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 13.15.

b. Computed only for a 2x2 Table

Table U.5.27. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.298	.016
	Cramer's V	.298	.016
N of Valid Cases		66	

Appendix V. Cover letter for questionnaire

To: Managing director/ Production manager

"Survey of electronic supply chain practise among manufacturing SMEs of the UK"

Hajar Fatorachian
Email: Hajar.Fatorachian@student.shu.ac.uk
Telephone: 07923213685

Dear Sir/Madam,

I am a PhD researcher at Sheffield Hallam University, investigating the role of Electronic supply chain practise among manufacturing SMEs in the UK. This research intends to provide insights into the factors influencing the adoption of electronic supply chain management in SMEs, in order to help SMEs enhance their electronic business processes.

As part of this research, I am launching this questionnaire survey to support my research. The questionnaire is brief and will only take 10 minute to fill out. I really appreciate if you can complete the questionnaire. There is a pre-paid envelope inside the sent envelope that you can send the questionnaire back.

Please be assured that all information you provide will be kept strictly confidential. Your name or other identifying information will not appear in any study report. The results from the survey will be reported as statistical summaries only for academic purposes. Moreover, you will be able to have access to the results of the survey if you wish to.

Please do not hesitate to contact me if you have any questions. Your participation represents a valuable contribution to the research.

Thank you very much for your cooperation.

Yours sincerely,
Hajar Fatorachian

A critical investigation of electronic supply chain practises among manufacturing SMEs of the UK

1. Does your company use E-business technologies (any kind of internet-based tools) in conducting its business activities?

Yes ☐ No ☐

2. How useful the following E-business technologies have been in performing business actions in your company? [Options: *1=Not relevant, 2=Not helpful, 3=Marginally helpful, 4=helpful, 5=Very helpful*]

IT/E-business technology	Rating
Internet	
intranet (a computer network that uses internet protocol technology to share information within the company)	
extranet (a computer network that allows controlled access from the outside, for specific business purposes)	
E-mail	
Web site of the company	
Customer Relationship Management (CRM)	
Supply Chain Management (SCM)	
Electronic Data Interchange (EDI)	
Enterprise Resource Planning (ERP)	
Electronic funds transfer	
E-procurement	
Other (please specify)	

3. How important the following E-business drivers are in conducting business in your company? [Options: *1=Not relevant, 2=Not important, 3=Marginally important, 4=Important, 5=Very important*]

Main E-Business Drivers	Rating
Globalisation	
Understanding customer requirements	
Appearance of Information and Communication Technologies(ICTs)	
Standards and protocols	
Closer integration with suppliers	
Agility and responsiveness in fulfilling customer requests	
Business flexibility	
Increased competitiveness	
Connectivity between different parties in a supply chain	
Technological innovation in business processes	
Other (please specify)	

4. How helpful the use of E-business technologies has been for achieving following business objectives in your company? [Options: *1=Not relevant, 2=Not helpful, 3=Marginally helpful, 4=helpful, 5=Very helpful*]

Main Objectives	Rating
Cost reductions	
Price pressures	
Efficient information flow control	
Value chain integration	
Workflow coordination	
Enhanced interaction with suppliers	
Improving the quality of products	
Improved relationship with customers(Enhanced customer service)	
Efficient employment of human resources	
Improving customer service	
Complying with environmental and governmental regulations	
Innovation	

Improved competitiveness	
High turnover	
Other (please specify)	

5. Please rate the impact of using E-business technologies on the following supply chain processes in your company? [Options: *1=Not relevant, 2=Not beneficial, 3=Marginally beneficial, 4=Beneficial, 5=Very beneficial.*]

Variables	Rating
Supply chain management (SCM)	
Customer Relationship Management (CRM)	
Marketing research	
Management of distribution channels	
Order processing	
Production	
Logistics and returns process	
The product development and commercialisation process	
Planning synchronization	
The manufacturing flow management process	
Lead time management	
Procurement (firm's relationship with its suppliers)	
Inventory management	
Fulfilment (customer service processes involving physical distribution)	
Demand management process	
Other (Please specify)	

6. How useful the following E-business capabilities have been in integrating your supply chain? [Options: *1=Not relevant, 2=Not useful, 3=Marginally useful, 4=useful, 5=Very useful*]

E-business capabilities	Rating
E-Intelligence (improvements in operations and decision making, as well as creating new product-market opportunities)	
E-Collaboration (integrating and sharing data, through the internet or extranets)	
E-Communication (improvements in products and services and communication with customers and suppliers)	
E-Commerce (buying and selling of products and services through the internet)	

7. Does your company integrates its internal operations electronically with that of your;

Variable	Yes	No
Customers	☐	☐
Business partners	☐	☐
Suppliers	☐	☐

8. Does your company have the e-business capabilities to access the following information about your suppliers':

Variable	Yes	No
Production capacity	☐	☐
Available inventory	☐	☐
Processing lead times (The time required to procure or manufacture an item)	☐	☐
Delivery flexibility	☐	☐

9. Do your suppliers have up-to-date access to the following information about your company?

Sales Yes☐ No☐

Stock levels Yes☐ No☐

10. Have the following Inter-organizational relationships factors influenced the adoption of E-supply chain in you company?

Variable	Yes	No
Communication	☐	☐
Collaboration	☐	☐

Trust between different parties in the supply chain	☐	☐
Information sharing	☐	☐
Trading partner's power (Requirement to adopt a certain kind of technology)	☐	☐

11. Are different IT capabilities (e-communication, e-commerce, e-intelligence and e-collaboration) aligned with the overall business strategy in you company?

Yes ☐ No ☐

12. How the following environmental variables have influenced the adoption of E-business technologies in your company? [Options: *1=Not relevant, 2=significantly, 3=Marginally significantly, 4= significantly 5=Very significantly*]

Environmental Variable	Rating
External pressure	
Competitive pressure	
Business partners' pressure	
Customer requirements	
IS vendor support	
Financial resource availability	
Industry	
Government	

13. How the following organizational factors have influenced the adoption of E-business technologies in your company? [Options: [Options: *1=Not relevant, 2=significantly, 3=Marginally significantly, 4= significantly 5=Very significantly*]

Organizational Variable	Rating
Management attitude and support	
Attitude and knowledge of employees	
Organizational IT competence	
knowledge management	
Inter-organization relationship	
Size of the firm	
Age of the firm	
Culture (The collective behaviour of people as well as	

organizational values and norms)	

14. Please rate the following benefits of e-business technologies in terms of your own company's experience: [*1=Not relevant, 2=Not beneficial, 3=marginally beneficial, 4=beneficial, 5= Very beneficial*]

Benefits of E-business technologies	Rating
Improved supply chain management	
Increased revenues	
Lower production cycle times	
Improved customer service and speed of response	
Enhanced customer satisfaction	
Enhanced competitive advantage	
Expanded geographical coverage and market share	
Creating interactive relationships with suppliers	
Creating interactive relationships with customers	
Faster and improved delivery of new products and services	
Improved market transparency and understanding of market	
Cost reductions resulting from standardisation and process efficiencies	
Increased value resulting from efficient management of resources	
Reduced inventory levels	
Improved planning and standardization of procedures	
Enhanced information on performance of suppliers	
Efficient collaboration between design, product development and fulfilment	
Improved communication and information sharing	
Efficiency and productivity improvements	
Efficient information and product flow management	
Lower transaction costs	
Improved forecasting and planning	

15. Please rate the following barriers to the use and adoption of e-business technologies in terms of your own company's experience: [*1=Not relevant, 2=Not a constraint, 3=Moderate constraint, 4=Strong constraint.*]

Obstacles of E-Business Technologies	Rating
Security and privacy concerns	
Being unaware of the potential of ICT in improving operations	
Low supplier E-Business use	
High cost of computing and networking technologies	
The Lack of necessary IT skill and knowledge	
High operation costs of ICT	
High costs of research in the area of IT	
Unconvinced of the benefits of E-Business	
Conducting business in small and defined niche markets	
Limited network bandwidth (Internet) or weak access to internet	
Unreliable/Inconsistent Network	
Difficulty or high costs of outsourcing IT activities	
The lack of personnel to implement ICT	
Other (Please specify):	

16. How important the following factors are for successful adoption of E-business technologies your company? [Options: *1=Not relevant, 2=Not important, 3=Marginally important, 4=Important 5=Very important*]

Factors	Rating
Motivation of the owner of the firm	
Experience and skill of the owner of the firm	
Knowledge about managing organizational growth in the all organizational level	
Access to financial resources	
Access to technological resources	
Access to human resources	
Effective communication and relationship with customers	
Operating in a developing market	
Standardization of production process	
Focus on flexibility as competitive advantage	
Innovation	

Other (Please specify):

17. How successful your company has been in implementation of E-business?

Very Successful ☐ Successful ☐ Partially Successful ☐

Failure ☐

18. Your contact details:

Company Name

Title

Name

Position in the Company

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